

Policy Number 000

Authorized By: Michael W. Bennett

Title: Safety Policy and Procedure Index

Effective Date: 12/06/10

Safety Policy and Procedures	Responsible	Reviewed	Revision
001. Ergonomics – Backs and Soft Tissues	Kris Chipman	First Quarter	06/04/2015
002. Abrasive Blasting Operations and Compressed Air Program	Kris Chipman	First Quarter	06/04/2015
003. Office Ergonomics and VDT's	Sarah Nelson	Second Quarter	06/04/2015
004. Excavation Safety	Brad Smith	Second Quarter	06/27/2014
005. Respiratory Protection Program	Scott Knowlen	First Quarter	03/05/2015
006. Workplace Protection Program for Lead and Other Heavy Metals	Scott Knowlen	Second Quarter	06/27/2014
007. Watch for Fire, Smoke and Sparks	Kris Ballard	Fourth Quarter	12/04/2014
008. Safe Rigging Operations	Pat Sughrue	First Quarter	06/04/2015
009. Concrete Demolition	Kris Ballard	First Quarter	03/05/2015
010. Hearing Conservation Program	Scott Knowlen	Third Quarter	09/04/2014
011. Fall Protection Program	Kris Ballard	Second Quarter	06/04/2015
012. Hazard Communication Program	Ben Connors	Fourth Quarter	12/04/2014
013. Chain Saw Safety	TBD	Third Quarter	09/04/2014
014. Exposure to Heat and Cold	Sarah Nelson	Third Quarter	05/06/2014
015. Welding and Cutting Hazard Assessment	Scott Knowlen	Second Quarter	06/27/2014
016. Zero Energy State (ZES) Lock-Out/Tag Out	Scott Mitchell	Second Quarter	06/27/2014
017. Hand and Finger Protection	Brad Smith	Fourth Quarter	12/04/2014
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022. Use of Crane Suspended Personnel Baskets	Scott Knowlen	First Quarter	03/05/2015
023. Incident Investigation	Amy Webber	Third Quarter	03/06/2014
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025. Bloodborne Pathogens	Shawna McKenney	First Quarter	03/05/2015
026. Scaffold Safety is Everyone's Responsibility	Darius Bors	Fourth Quarter	12/04/2014
027. Guidelines for SHARE Committee	Mike Bennett	First Quarter	06/04/2015
028. Crane Safety	Roy Bolton	Second Quarter	09/04/2014
029. Safe Handling and Storage of Compressed Gas	Kris Ballard	First Quarter	03/05/2015
030. Placing Concrete	Kris Ballard	Third Quarter	09/04/2014
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034. Workplace Crystalline Silica Protection Program	Scott Knowlen	First Quarter	06/04/2015
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053. Work Activity Planning	Bruce Brown	First Quarter	03/05/2015
054. Airless Spraying Operations Program	Kris Chipman	First Quarter	06/04/2015
055. Line Breaking/Equipment Opening Procedure	Kyle Pellerin	Third Quarter	06/04/2015
056. Inspections by Government or State Agencies	Dan Coffey	Second Quarter	06/04/2015
057. Spill Prevention and Control Safety	Lauren Lohn	Second Quarter	06/27/2014
058. Planning For Work Outside of Established Work Hours or Conditions	Scott Knowlen	Third Quarter	09/04/2014
059. Vacuum Truck Safety	Scott Knowlen	Fourth Quarter	12/04/2014
060. Workplace Protection Program for Benzene	Scott Knowlen	First Quarter	06/04/2015
061. First Aid Protocols	Sarah Nelson	Fourth Quarter	03/05/2015
062. Distracted Driving Policy	Mike Bennett	Second Quarter	03/05/2015
063. Ladder Safety	Scott Knowlen	Third Quarter	09/04/2014

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1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 The purpose of ergonomics is enhancing human performance while improving health, comfort, safety and job satisfaction. Fitting the job to the team member not the team member to the job is one of the main goals of ergonomics.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Ergonomics: The science of designing the job, equipment and workplace to fit the team member.
- 4.2 MSD: Musculoskeletal disorder
- 4.3 OSHA Guidelines: A guideline is a tool to assist employers in recognizing and controlling hazards. It is voluntary. Failure to implement a guideline is not itself a violation of the General Duty Clause of the OSHA Act. Guidelines that OSHA develops will provide information to help employers identify ergonomic hazards in their workplace and implement feasible measures to control those hazards.

5 Policy

- 5.1 Prior to any work, ergonomic hazards will be identified and a job or task specific activity plan developed.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Overview

7.1.1 Ergonomics is a reasonable and applied science used to design an environment which eliminates the opportunity for soft tissue pain or a Musculoskeletal Disorder (MSD). Soft tissue pain, unlike a sudden traumatic event (slip, trip or fall) that causes a broken bone or other visible injury may come on slowly; over time it is often hard to see the evidence of the problem.

7.1.2 These disorders affect the muscles, tendons, ligaments, joints, cartilage, nerves, blood vessels and spinal discs.

You must ask yourself these questions when assessing a job:

- **How long** is the duration of the exposure?
- **How often** is the frequency of the exposure?
- **How much** is the intensity of the exposure?

7.2 Prevention

7.2.1 Most MSD's are preventable. Working smarter not harder and having a basic knowledge about the causes of these types of injuries are key to prevention. Early reporting of aches and pains can reverse or minimize soft tissue injury, with or without medical attention. Ergonomic safeguards can be put into action before the injury occurs, preventing the need for medical care in many cases. The longer a person works with an ache or pain, the longer it will take to recover

7.2.2 Prevention is the key. Short breaks, stretching and sometimes just stopping to take a few deep breaths are all preventative measures. Frequent stretching is an important tool we tend to under use. Stretches help prevent MSDs. Warming up before work is the best way to reduce the risk of these injuries. Cold joints, tendons and muscles are more likely to get strained by sudden movement or exertion. Benefits of pre-work stretches are:

- Raises the heart rate (the body is prepared for physical exertion).
- Speeds up nerve impulses (reflexes are enhanced).
- Reduces muscle tension while reducing the risk of injury, particularly to connective tissue like tendons.
- Increases flexibility, joint mobility and sends oxygenated blood to the muscles groups.

7.2.3 Stretches are required by all team members prior to the start of their shift and prior to returning to work after the lunch break. Many projects have found increased benefits in reducing MSD's by doing additional stretches (i.e. after breaks). Additionally, projects should consider additional stretches when work shifts extend beyond 10 hours.

Management is responsible to ensure that teams are stretching effectively.

- Doing the proper stretches
- Doing them smoothly without bouncing
- Focusing on the muscle group intended for each stretch
- Holding each stretch for the **full 10 seconds**

Please refer to Cianbro.net under Resources for our company stretches.

- 7.2.4 Job rotation can be an option to do work tasks that have a high risk of MSD injuries. This allows for team members to get the rest they need to do higher risk (repetitive, force, vibration, etc.) activities and recover from them without the onset of any MSD injuries. Keep in mind that effective job rotations are when you work different muscle groups between repetitive job functions.
- 7.2.5 To protect your upper extremities, consider the following:
- Ensure the grips on your hand tools are not so large that it is difficult to grasp or too small that you must use your fingertips.
 - Be sure that sharp edges are covered with padding.
 - Power demolition tools must be kept sharp and tuned up, so that the tool does the work and not the person holding it.
 - Do not work overhead for extended periods of time. Bring yourself up to the work. If you must do overhead work, take frequent breaks to allow the blood to flow back into your hands as the heart does not pump blood above shoulder level efficiently.
 - Arms outstretched and elbows raised also place someone at risk of injury. Frequent breaks and regular stretching are very important in these situations.
 - If there is vibration exposure; consider anti-vibratory gloves or anti-vibratory tool handle wraps. When feasible consider purchasing newer tools that may be available with built in anti-vibratory features.

7.3 Risks

- 7.3.1 Construction is one of the highest at risk industries when it comes to ergonomics because it involves work above the shoulders and below the knees. The factors that can contribute to soft tissue injuries are very complex and a checklist cannot cover all of the variables. However, the following are some key factors that should be eliminated or minimized:
- Working with a bent or flexed wrist.
 - Working with the neck bent at more than a 15 degree angle.
 - Vibration from power hand tools.
 - Hand tools that are not balanced as they are difficult to hold.
 - Hand tools with an overly large grip.
 - Hand tools with a trigger-grip span of more than 4 inches between the thumb and forefinger.
 - Hand tools with sharp edges or ridges.
 - Hand tools with direct air exhaust onto the hand.
 - Hand tools that do not meet the requirements of the job.
 - Using body parts for hammers (hands, feet, etc.).
 - Repetitive hand, arm and shoulder motions.
 - Arms and elbows held high or outstretched.
 - Controls, tools or materials beyond easy reach.
 - Controls that require too much force to operate easily.
 - Working with the body leaning forward.
 - Handling materials from heights above the shoulder or below the knee.
 - Handling large bulky material regardless of its weight.
 - Over excessive twisting or stretching.
 - Repetitive pushing or pulling, including requirements for high strength.
 - Standing or sitting for long periods of time.
 - Working in an immobile position for extended periods.
 - Static muscular work.
 - Poorly designed work surfaces and chairs.
 - Work space that doesn't accommodate the smallest person for reach and the largest person for clearance.
 - Inadequate lighting and visibility.
 - Peak loads of muscular effort.

7.3.2 Most MSD injuries are caused by awkward postures. The risk factors include: force, repetition, vibration, contact stress, posture, and the environment. The following are some of the most common tasks or exposures that can produce soft tissue aches and pains:

- Repetitive load handling.
- Handling loads that require awkward body postures, such as bending and reaching out to an object that cannot be held close to the body in an erect posture.
- Handling excessively heavy and/or bulky, difficult-to-hold materials.
- Twisting the torso to one side while lifting.
- Repetitive or sustained bending over.
- Handling demands beyond the capabilities of team members assigned to the job.
- Unprotected, prolonged use of vibrating tools and equipment.
- Repetitive flexion (wrist bent inward toward palm), extension (wrist bent upward toward outer forearm) or deviation (wrist bent to the side in either direction) of the wrist, especially while exerting force or grasping an object.
- Direct pressure on or compression of delicate parts of the hand or wrist.
- Repetitive twisting hand motions or repetitive forceful hand work.
- Poor body mechanics.
- Exposure to cold temperatures.
- Stress

7.4 Lifting

7.4.1 **Team members will not lift over 50 pounds alone.** If a load is too heavy to lift alone, seek additional help. Mechanical means are encouraged. We provide lifting/force aids from come-a-longs, chain falls, to forklifts and overhead cranes, depending on the nature of the job. Proper lifting techniques are essential and are illustrated at the end of this Safety Policy and Procedure. Individual lifts over 50 lbs will require additional planning and approval by the project manager to evaluate materials and/or individuals capabilities. Cianbro management is responsible to ensure team members work within personal limitations and work modifications around lifting.

7.4.2 Back pain injuries/illnesses can be prevented. Understand your back and take proper care of it. Here are some basic guidelines to follow:

- Warm up before you lift. Bend or stretch gently to get ready.
- Use proper lifting techniques, as illustrated on attached sheets.
- Never twist at the waist. Pivot from your feet.
- Push, rather than pull. It's much easier on your back. Brace your hands on the object, set your back in an extended position, then do all the pushing and moving with your legs.
- If you're lifting or working overhead, get closer to the object or the work you're doing.
- Get help. If you must lift something that feels heavy or awkward to you, ask someone to help, or get equipment to help. Use dollies, carts or mechanical assistance at all times.
- Take your time. Hurrying causes your muscles to act inappropriately, increasing the chance of injury.
- STRETCH. Maintaining any position too long can be harmful. If you're sitting, kneeling or bent over for any length of time, stop frequently, stand and stretch your back, placing your hands just above your waist, against your back. If you're working in a standing position, or with arms overhead, stop frequently, squat and stretch.
- If you have a back problem, whether job related or not, inform your supervisor immediately.
- Exercise daily. Keep the muscles that surround your spine strong and flexible. Please refer to 9.2 Appendix B for some simple back strengthening stretches to do at home.

7.5 Injuries

- 7.5.1 Immediately report any new aches and pains to your supervisor or safety specialist. You will be asked to complete a First Report of Incident and taken to a clinic to be checked and possibly placed on work modifications. You may also need to take an over-the-counter anti-inflammatory to reduce inflammation in the area of the discomfort. The sooner a soft tissue problem is detected and treated, the greater opportunity for a quick and successful healing.

7.6 OSHA Enforcement & Guidelines

- 7.6.1 OSHA will conduct inspections for ergonomic hazards and issue citations under the General Duty Clause and issue ergonomic hazard alert letters where appropriate.
- 7.6.2 OSHA has established ergonomic guidelines. These voluntary guidelines will provide information to help employers identify ergonomic hazards in their workplaces and implement feasible measures to control those hazards. Only one currently relates to our industry, "Shipyards". For more information please refer to our Marine Safety Policy and Procedure.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials required and PPE requirements under this policy and to provide necessary training.

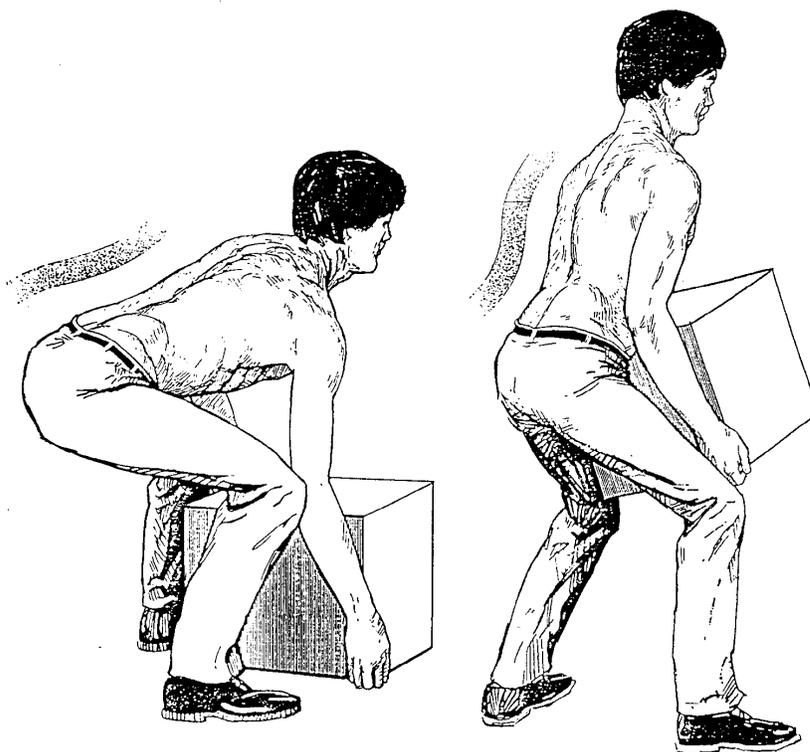
9 Related Documents

- 9.1 Appendix A Proper Lifting Techniques
- 9.2 Appendix B Flexibility and Strength
- 9.3 Documents available on Cianbro.net

Cianbro Stretches Poster

Proper Lifting Techniques:

- **Take your time:** Stretch slowly and smoothly; never bounce.
- **Do each stretch gently:** Maintain normal breathing during each movement.
- **You should not feel pain while stretching:** If any stretch causes continued discomfort, you should avoid it.
- **Do not rush through stretches.**
- **Focus attention on muscle being stretched; try to limit movement in other body parts.**



Back injuries can be avoided if your back is maintained in good normal alignment and if you abide by the following rules:

1. Keep a wide base of support.

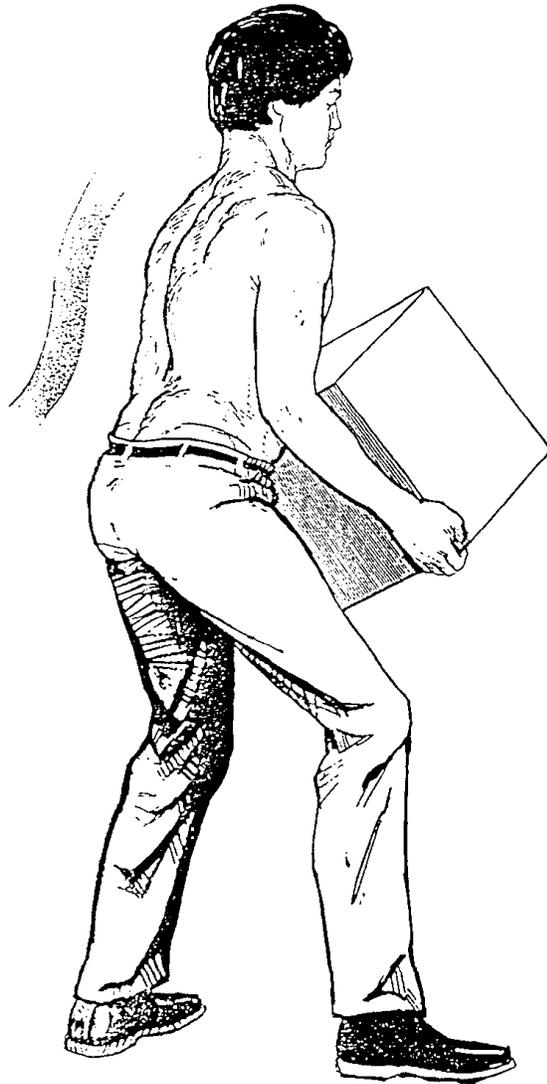
Spread your feet apart to make yourself more stable. One foot may be placed ahead of the other.

2. Keep the object close to you.

The farther the object is from you, the more pressure you will have on your low back. A forty pound box held two feet in front of you could increase your low back pressure by as much as 400 pounds.

3. Bend your knees and hips.

You need to bend your hips and knees in order to lower yourself at the same time.



4. Maintain your lumbar curve.

This is the key. You should extend your back slightly to allow your butt to stick out. This will keep your back muscles in a position where they can work with the most strength and maintain the normal curve in the low back to prevent disc injuries. Keep your lumbar spine in its normal inward curve during the lift.



5. Do not twist or bend sideways.

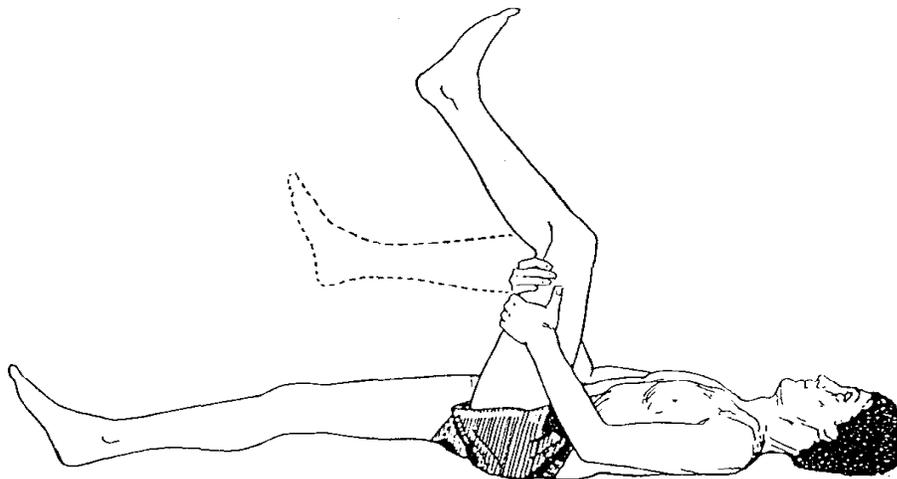
Set your spine in the normal position with your back slightly extended. Face the object you are picking up or working on. If you must turn to change your direction, pivot with your feet.

FLEXIBILITY AND STRENGTH

The lack of flexibility is a major risk factor in back injuries. There are many muscles in the thighs, the buttocks, the abdomen, and the back area itself that attach to the spine and the pelvis. When any of these muscles become tight and lose their flexibility (due to excessive sitting, standing, over-working, sustained positioning or pain) they produce a pulling or holding force on the spine or pelvis. This removes some of the spine's ability to move fully and safely.

Muscle stretching is very important to spine health but must be done properly. Fast, bouncing stretches will irritate the muscle fibers and can actually cause them to tighten in response. Effective and safe stretching must be done slowly and deliberately, always trying to coax the muscle into a more lengthened position. Stretching can be uncomfortable but should not result in pain that lasts after the exercise. Muscle strength is important to the prevention of injury. Muscles need enough strength to move vertebrae while protecting the joints and ligaments. Muscles need a balance of flexibility and stability.

Physical therapists have identified some simple quick exercises that are good for your back to build flexibility and strength of muscles and provide repair and nutrition of discs and joints. Start gently and do not push yourself too much. These exercises are intended to preserve a normal back. They are often used to treat certain back pain problems. If you have back pain, or if these exercises bother your back, notify your supervisor and you may wish to consult a physical therapist for some different exercises.

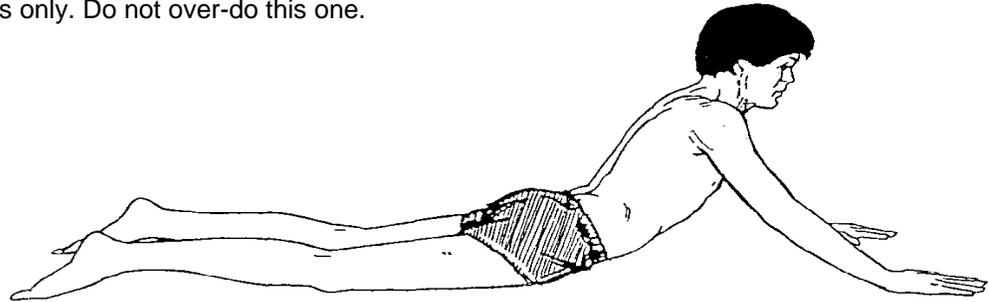


1. To stretch hamstrings.

Lie on your back with legs flat. Pull one knee toward your chest. Grasp your thigh under your knee and hold it firmly to your chest as you try to straighten your leg at your knee. Make it a slow stretch-and-relax process for about a minute to each leg.

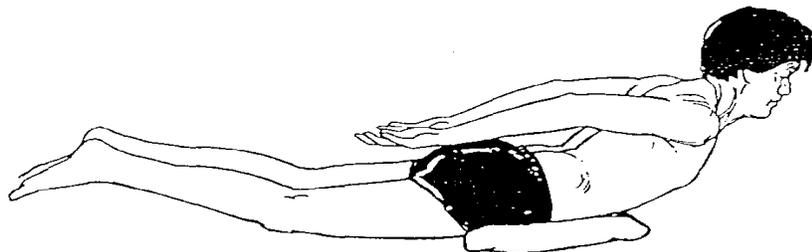
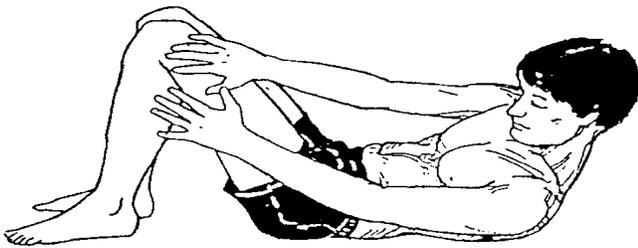
2. Prone press-ups.

This is valuable to increase joint mobility and disc nutrition and repair. It also stretches hip flexor muscles in the groin. This exercise must be done gently. Lie flat on your belly. Place your hands on the surface, so that you bend backwards at your lower back. Move gently. Hold the position three seconds. Repeat three times only. Do not over-do this one.



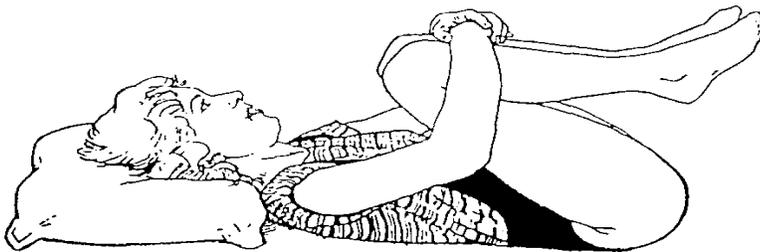
3. Diagonal half sit-ups.

The safest and most effective sit-ups are done only part way up and on a diagonal, with knees bent. This helps low back mobility and trunk muscle stability. This exercise is done lying on your back with your legs bent. Reach your hands forward and curl up half way turning your body to one side. Hold briefly. Lie back and relax a second. Then sit up again toward the other direction. Repeat to fatigue.



4. Active back extension

Do this one slowly and gently. Lie flat on your belly with your arms down at your sides. Lift your head, chest, and arms up off the surface a few inches. Do not extend your head back. Hold a few seconds. Relax. Repeat to fatigue.



5. Passive flexion stretch.

Lie on your back. Pull your knees into your chest and hold them there relaxed for 30 seconds. Do a gentle standing back-bend after this.

Policy Number: 002**Authorized By:** Michael W. Bennett**Title:** Abrasive Blasting Operations and Compressed Air Program**Effective Date:** 03/01/75Page 1 of 5

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 Provide a safe working environment during abrasive blasting operations. We can accomplish this by understanding abrasive blasting hazards and the controls that can be implemented to reduce, avoid or eliminate them.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Abrasive Blasting: Abrasive blasting is the most common surface preparation technique used to remove old paint and other surface materials such as rust, mill scale, dirt, and salts. In abrasive blasting, compressed air is used to propel abrasive material from a blast pot, through a blasting hose to a nozzle, where it is directed to the work area at high velocity by the operator.
- 4.2 Base Materials: The base materials used include iron and non-iron- containing metals.
- 4.3 Media: Common blasting abrasives used for paint removal and surface preparation in fabrication shops and bridges include coal slag, copper slag, and other metallic grit and shot.
- 4.4 Surface Coatings: Any paints or primers used to protect base materials from corrosion.

5 Policy

- 5.1 The project's top management is responsible for the abrasive blasting operation. Management shall implement and adhere to this policy and all other Cianbro policies and procedures relating to this operation.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of media blasting materials under this policy.
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 The corporate safety department is responsible for maintaining this document.

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7.1 Precautions

Team members who are engaged in abrasive blasting are at an increased risk of exposure to toxic dusts, high noise levels, and a range of other safety and health hazards. Helpers (e.g., the "pot tender" and cleanup personnel) and others may also be at risk if they work in the vicinity of areas where abrasive blasting is conducted.

7.1.1 The following requirements must be in effect prior to conducting any blasting of unknown materials, including coatings:

- Obtain positive documentation on materials/ingredients or remove sample(s) and conduct lab analysis of materials. This shall be done before materials are shipped to Pittsfield from a jobsite, or before any on-site blasting is initiated. Identification should be coordinated with the client.
- The composition and toxicity of the dust created during blasting operations shall be considered in making an evaluation of the potential health hazards. Team member exposure must be reduced to below the applicable TLV's (or PEL's whichever is lower) if possible. Feasible engineering and administrative (work practice) controls must be identified and implemented to reduce exposure to the lowest possible levels.
- Where there is potential for flammable or explosive dust mixtures, the blast nozzle shall be bonded and grounded to prevent the build up of static charges. Organic abrasives shall be used only in automatic systems.
- Identify contractually, before shipment, who is responsible for the waste to be generated and plan accordingly for disposal.
- Review blasting methods and materials then select the proper respiratory protection for the anticipated hazard(s). Use a NIOSH approved type C or CE supplied air respirator for abrasive blasting. Follow Cianbro's respiratory protection Safety Policy and Procedure for other tasks and for safe respirator use.
- Grit materials to be used shall be identified and the appropriate MSDS of the grit reviewed. Elements in the MSDS shall be included in the activity plan and reviewed with all involved team members.

7.2 Procedure

7.2.1 Before any blasting activities commence and the precautions have been addressed, the following considerations shall be placed:

- Personnel must be equipped with the appropriate safety equipment (e.g.: respirator, gloves, protective clothing, foot protection, hearing protection, eye protection, etc.).
- Personnel must use proper hygiene practices while in hazardous areas, and remain fully protected at all times in the work area. Before leaving work areas, ensure protective clothing is removed, properly stored in a controlled area and wash facilities used to remove any contaminants from exposed skin. Specific procedures and facilities established for personal hygiene shall be covered in the activity plan and reviewed with all team members.
- Air monitoring should be planned for and accomplished for those activities which involve known/suspected hazards (e.g.: lead, silica, PCB, etc.), unless we can substantiate similar operations which we have monitoring results on file for.

- All personnel shall be current with medical questionnaires, pulmonary function test (PFT) and fit testing approvals.
- If segregation of waste generated by job is necessary, proper controls must be in place to collect and contain waste in approved storage/shipping containers properly marked and labeled. (Contractual agreements should dictate).
- Dust shall not be permitted to accumulate on the floor or on ledges outside the blast enclosure. Dust, shot, and other abrasives shall be cleaned up promptly to prevent slipping hazards.
- Training shall be conducted for all team members prior to abrasive blasting activities following this safety policy and procedure elements and the specific written activity plan developed for work to be accomplished. Activity plans shall cover specific PPE, engineering (ventilation requirements), administrative controls and hazards/solutions to be used.
- Cianbro Safety Policy and Procedures for other safety hazards like noise or fall protection shall be followed. Activities involving the potential for exposure to arsenic will include safety precautions following OSHA standards and will be covered in the activity specific safety plan.
- Abrasive blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.

7.3 Compressed Air Use

- Team members shall not use compressed air to clean off their clothing. Compressed air may only be used for cleaning work surfaces when reduced to less than 30psi and effective chip guarding and personal protective equipment must be identified within the activity plan (ensure you are not creating additional uncontrolled hazards). Please note: The 30psi limitation does not apply to cleaning out forms prior to pouring concrete, blowing water off a barge deck (or similar surface) prior to welding, or blasting in a blast booth.
- All air hoses exceeding 1/2-inch inside diameter shall have a safety device at the source of supply or each branch line to reduce pressure in case of hose failure. Lines used for cleaning forms may be used without a safety device as long as the line is marked "Blowpipe Use Only" and adequate eye and face protection are used.
- Compressed air cylinders (if used) shall be visually inspected to ensure safe working condition. This inspection shall be conducted in accordance with Hazardous Material Regulations for compressed air cylinders.
- All hoses, hose connections, regulators, whip checks and valves shall be inspected prior to use. Ensure whip checks or other positive means of preventing accidental disconnection are provided (e.g. Chicago fittings are pinned at each connection).
- Air receiver shall have readily visible pressure gauges with one or more spring loaded safety valves. The relieving pressure shall be set to not exceed more than 10 percent of the maximum allowable pressure of the receiver.
- Test all safety valves frequently to insure proper working order. All safety devices shall be installed so that they cannot be rendered inoperable.
- Install drain pipes and valves at the lowest point in the receiver for drainage of oils and water. Drain periodically to prevent accumulation of excessive amounts of liquids.

7.4 Disposal

7.4.1 Waste materials must be properly disposed of in accordance with State, Federal, Cianbro and Contractual Requirements.

- Prior to shipping materials, a sample should be analyzed for positive identification and proper manifesting.
NOTE: Ensure client involvement in cases of contract agreements.
- When contractual agreements dictate, manifests should show the client as generator and responsible for proper manifesting, shipping and disposal.

- All original manifests must be sent to the corporate safety department if Cianbro is the generator. If Cianbro is not the generator, then copies of the manifest must be sent.
- Waste materials must be disposed of through one of Cianbro's approved hazardous materials and waste disposal companies.

7.5 Records

7.5.1 All reports, records, logs and forms used and required to manage blasting and waste activities shall be completed and stored in a specified location in Pittsfield.

7.5.2 An accurate log of all blasting activities conducted in the Fabrication & Coating Facilities blasting areas and at each jobsite shall be maintained.

7.6 References

- 40 CFR 264, Protection of Environment, Subpart C, D.
- DEP Chapter 851.
- Hazardous Materials/Waste Management Manual.
- Hazardous Materials/Waste Procedures: (03-501, 03-502, 03-503, 03-504, 03-505).
- Cianbro Corporation Workplace Respiratory Protection Program Safety Policy and Procedure.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 29 CFR-1910 (General Industry)

9.2 29 CFR-1926 (Construction)

9.3 ANSI Standards

9.4 Document available on Cianbro.net>Standard Operating Procedures - SOP.

Pre-Blast Checklist	SD1017
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Table 1. Potential Air Contaminants Associated with Abrasive Blasting	
Source	Potential Air Contaminants
Base Material (e.g., steel, aluminum, stainless steel, galvanized steel, copper-nickel and other copper alloys)	Aluminum, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc
Surface Coatings (e.g., pre-construction primers, anticorrosive and antifouling paints)	Copper, barium, cadmium, chromium, lead, tributyl tin compounds, zinc
Abrasive Blasting Media (e.g., coal slag, copper slag, nickel slag, glass, steel grit, garnet, silica sand, soda)	Arsenic, beryllium, amorphous silica, cadmium, chromium, cobalt, crystalline silica, lead, manganese, nickel, silver, titanium, and vanadium
Sources: EPA, 1997; EPA, 2000; NFESC, 1996; NIOSH, 1998.	

Policy Number: 003**Authorized By:** Michael W. Bennett**Title:** Office Ergonomics and VDT's**Effective Date:** 01/01/75Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 Ergonomic needs are different for each individual because no two people are exactly alike and each has different work habits and tasks. This is why it is important that furniture systems and accessories be adjustable to meet individual needs. The goal of ergonomics is to enhance human performance while improving health, comfort, safety, and job satisfaction.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 CTS: Carpal Tunnel Syndrome.
- 4.2 EMFs: Electric and magnetic fields.
- 4.3 Ergonomics: The study of the relationship between people, their activities, their equipment, and their environment.
- 4.4 Ergonme: Our annual video display terminal training consists of an online training program.
- 4.5 MSD: Musculoskeletal disorders.
- 4.6 NIOSH: National Institute for Occupational Safety and Health.
- 4.7 OSHA: Occupational Safety and Health Association.
- 4.8 RSI: Repetitive Strain Injuries.
- 4.9 VDT: Video Display Terminal.

5 Policy

- 5.1 Cianbro intends to have good ergonomic practices in place for the office environment. Cianbro has an obligation to provide a safe working environment, and it is a condition of team member's employment to work safely.

6 Responsibilities

- 6.1 Having a proper Video Display Terminal (VDT) set up is largely within each VDT user's control. Making sure they are using correct posture, taking breaks, exercising, varying their tasks and having a proper set-up while using their VDT equipment is essential and reviewed in our mandatory annual VDT training.
- 6.2 Corporate Safety is responsible for maintaining this document.

7 Office Ergonomics and VDT's Index

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7.1 Ergonomic Disorders

Why do we need to be so concerned with having a proper ergonomic set up? An improper workstation setup or improper use can cause long-term Musculoskeletal Disorders (MSD); which are also known as; Repetitive Strain Injuries (RSI). RSI is not limited to users of VDT's. Since it is caused by any repetitive motion and fixed body positions, activities such as playing a musical instrument or kayaking can be a source of an RSI.

7.1.1 Know the Warning Signs

Supervisors should be alert to behaviors that signal a developing problem like:

- Pain gestures and/or complaints of discomfort.
- Rubbing, stretching or shaking of body parts, fidgety.
- Low quality productivity.
- Self-treatment (wearing a non-prescribed brace or rolling up a jacket and putting it in their lower back in their chair may indicate they are experiencing some lower back discomfort/pain).

7.1.2 Musculoskeletal Disorders (MSD)

Musculoskeletal Disorders can be serious, if not taken care of early. Chronic symptoms can lead to disabling injuries, even surgery. Remember that early detection and treatment has a more successful outcome.

7.1.3 MSD injuries depend on the following factors:

- Duration of the exposure (*How Long?*).
- Frequency of the exposure (*How Often?*).
- Intensity of exposure (*How Much?*).

Keep in mind that it could be a combination of these factors.

By asking these questions above, you will be able to assess the team member's job duties and see how many factors/risks they may have. Make adjustments to avoid a possible MSD injury.

7.1.4 Carpal Tunnel Syndrome (CTS)

Carpal Tunnel Syndrome is inflammation or other symptoms that cause the median nerve to be pinched in the carpal tunnel of the wrists. Mainly due to repetitive use of the hand, wrist and improper hand positioning causes the tendons to swell.

7.1.5 Symptoms with these disorders are:

- Soreness
- Swelling
- Skin discoloration
- Numbness
- Tingling
- Burning
- Radiating pain
- Decreases strength
- Decreased movement

These usually develop gradually but sometimes can appear suddenly. Symptoms can be one or a combination of a few of them.

7.2 Ergonomic Risk Factors

Activities involving one or more of the following ergonomic risk factors, either individual or in combination, may contribute to or result in an increased risk of discomfort or injury.

- **Static Postures**
Example: prolonged sitting or standing, unsupported back, unsupported arms, neck rotation or side bending and fixed or staring vision. Static body positions can cause your muscles to tense and lead to discomfort and pain. Static body positions, such as using your VDT for long periods at a time, can put strain on your muscles and lead to discomfort and fatigue. You should vary your tasks throughout the day.
- **Awkward Postures**
Example: Poor body mechanics, twisted torso, slouching, neck rotation/side bending, bent wrists and reaching overhead.
- **Prolonged Forceful Exertions**
Example: Pinching, grasping, keying, mousing, writing, and stapling.
- **Repetitive Motions**
Example: sorting, keying and stapling.
- **Compression or Contact Stress**
Example: this is resting or pressing the forearm, wrist or hand on hard or sharp surfaces.
- **General Environment**
Example: Lighting, noise, weather (hot/cold) conditions.
- **Work Station Set Up**
Example: How you arrange your workstation. Work smarter not harder.

The good news is injuries from these risk factors can be prevented. Understanding risk factors and practicing basic ergonomic principles is the first defense against possible injury and lost productivity.

7.3 Keys to a Proper Ergonomic Setup

You control many of the circumstances of your VDT work. It is up to you to make sure you use correct postures, take breaks, exercise, vary your tasks, properly set-up and use your VDT equipment appropriately. After reading this Safety Policy and Procedure you will be able to recognize the ergonomic hazards and be able to eliminate them. Team members with questions regarding the ergonomics of individual workstation, or any safety-related matters, should contact their immediate supervisor or jobsite safety specialist.

7.3.1 A comfortable overall working position is the most important consideration in how you setup your VDT workstation equipment. VDT-related work discomfort can be caused by a number of factors that are part of your work requirements. You can minimize stress by controlling some of these factors such as, how you set-up your VDT workstation and how you design and perform your work. Once you have your VDT equipment setup so you are in the most comfortable position, you will be able to use your equipment with less discomfort and become more productive.

7.3.2 OSHA states that the workstation and equipment must have sufficient adjustability so that the team member is able to be in a safe working posture and to make occasional changes in posture while performing VDT tasks.

7.3.4 Sitting Basics/Posture

- Sit upright
- Hips slightly higher than knees
- Lumbar support below the belt line
- Seat pan should allow for a hand width gap in between the seat pan and the bend behind the knee
- Back angle upright or slightly reclined
- Feet supported either on the floor or on a footrest.
- Arms relaxed or supported
- Chair should be comfortable not too small or not too large
- Alternate standing and moving throughout the day. Get up and move at least once every 30 to 60 minutes

By not sitting up straight with your back resting on the back of the chair, you cause the natural "S" shape curve of your spine to distort and not be supported. This causes your muscles to assume the forces that would normally be carried by your spine. Incorrect sitting posture, such as slouching forward or being excessively reclined in your chair can result in back pain, muscular fatigue and discomfort. Tingling sensations in your legs or feet can result after sitting with your legs crossed, by sitting too far forward in your chair or by sitting on a firm seat. Excessive pressure on your thighs, through either improper posture or poor seating cushioning, can cause compression of the nerves in your legs and lead to numbness or the sensation of your legs and feet "falling asleep".

7.3.5 Work Surface Basics

- Designs should be based on job tasks.
- Create a "U" shape around your primary sitting area. Within your "U" shape keep commonly used items close by. For example, keep your pens, pencils, and phone close to your primary work set-up.
- Surfaces should be height adjustable.
- Reading/writing surface needs to be 2 inches higher than elbow height.

7.3.6 Keyboard and Mouse Basics

- At or slightly lower than elbow height
- Neutral wrist postures
- Relax shoulders
- Use a light touch (while keying and while grasping the mouse) While keying use a light soft touch (you should not hear a banging and pounding from the keyboard)
- Set-up shortcut keys and macros for common functions whenever possible. Keep a cheat sheet of shortcuts in close proximity for reference.
- The proper keyboard for user. The keyboard should fit the user not user fit the keyboard.
 - Keyboard should be centered directly in front of user. The letter "B" on the keyboard should be directly in front of user's belly button.
- Each mouse should fit the user, not the user fit the mouse.
- Selecting the right mouse
 - Choose a mouse that fits your hand.
 - Verify the mouse maintains a neutral positioning of the hand and wrist.
 - Choose a mouse that is the right size to support the natural curve of your hand.
 - Choose a mouse with buttons that neither cramps the fingers nor spreads them out too far apart.
 - Mouse should be on the same height as the keyboard. If the mouse and keyboard do not fit on a keyboard pull out tray, then look at removing the tray and placing both the keyboard and the mouse on the desk surface.
- Explore the option of using a mouse on each side of the keyboard to spread the exertion of clicking and pointing.
- If traveling and using a laptop use a plug in or wireless keyboard. For example a rubber type roll-out keyboard for extended keyboard use.
- If traveling and using a laptop use a mouse for extended use.

A padded wrist rest can help you avoid resting your arms or wrists on the sharp edges of your desktop. It can also help support the weight of your arms and keep your wrists straight when keying. A wrist rest (even for the mouse) will minimize contact stress allowing your wrist to rest in-between key strokes. It is very important to position your keyboard height properly to allow you to key with your wrists in neutral (ie. straight) and to decrease continuous repetitions by varying your tasks. Proper keyboard height would allow you to keep your wrists straight and your forearms parallel with the floor. If you do not have an adjustable keyboard tray, you can adjust your chair height and use a footrest to compensate. Use of a footrest is essential when feet do not touch the floor. A footrest also helps to promote postural changes and relieves pressure of the back part of the upper leg.

7.3.7 Monitor Basics

- 16-32 inches from eyes.
- At or slightly lower than eye level.

- Direct alignment (monitors should never be off to one side).
- Avoid glare or contrast from bright light sources.
- Clean monitor at least four times per month.
- Replace monitors that have a perceptible “jitter”.
- Adjust the screen angle to reduce glare
- For every 20 minutes looking at a monitor screen take 20 seconds and look away from the screen. Allow the eyes to blink and rehydrate.

Neck and shoulder discomfort or pain can be caused by improperly positioning your monitor and working materials. By positioning your monitor so that the height of the screen is at or just slightly below eye level when seated will help prevent neck and shoulder strain.

Glare is an annoyance that can cause your eyes to fatigue. You should place your monitor to eliminate sources of glare from objects such as open windows, overhead lights, etc. If you cannot eliminate glare, you can try an anti-glare filter. Glare and extremely close viewing without breaks can contribute to eyestrain. Throughout the workday, light levels change. You may need to adjust your monitor's brightness and contrast controls for greater screen clarity. This will help protect you from eye fatigue.

7.3.8 Telephone Basics

- Do not cradle the hand set between your shoulder and your head.
- Place the phone on your desk on the opposite side of your dominate hand and hold the hand set with your non-dominate hand (this will help you avoid cradling the phone when you need to grab a pen to write).
- Use the headset or speaker phone when appropriate.

7.3.9 Lighting

- Try not to place your screen directly in front of a window (glare from and outside light source creates eye strain).
- Avoid intense light.
- Avoid having your primary work station under direct lighting. If the lighting is too bright, explore the option of light filters.
- If primary work station is too dark it causes a person to strain their eyes. Add task lighting.

A task lamp (a separate moveable lamp) is useful for illuminating written materials to help relieve eye fatigue. It is important to position the light making sure that it does not cause glare or reflections on your monitor screen.

7.3.10 Document Holders

- Document holder either adjacent to monitor or between monitor and keyboard
- To avoid neck strain when there is a lot of reading and writing purchase a reading/writing slope stand (this can also be achieved with a large 3 ring binder)
- A copy stand or document holder is a necessary piece of your VDT equipment. By placing the copy stand at the same height and distance next to your monitor, you can help reduce both eye and neck discomfort.

7.4 Work/Rest/Stretch Schedules

- Rotate job tasks at least twice per hour.
- Stretch the whole body.
- Focus stretching on hands, wrists, and arms when repetitive keying and mousing.
- Change postures frequently. Move from sitting to standing or vice versa. Find ways to vary your work task to avoid stagnant sitting or standing. Stand up to read or proof a paper document.
- A minimum of a 15 minute break for every two hours of usage.
- Explore the option of setting up break reminders in outlook calendar.

Stretching exercises are an important component in helping to prevent discomfort while working with your VDT. Stretching exercises can help relieve and prevent muscular aches and pains

when working on your VDT for prolonged periods. For further information on Cianbro stretches please refer to our stretches poster on the SOP.

7.5 Sit/Stand Work Stations

If a work sit/stand station is required based on your work modifications, then an ergonomic evaluation is required.

7.5.1 Sit/Stand Work Station Basic Requirements

- Stand no more than 30 minutes.
- Avoid standing in the same position for the full 30 minutes. Shift the body weight and use a foot rest even when standing, with one foot slightly in front of the other.
- Use an anti-fatigue floor mat no less than ½ inch thickness. Most sit/stand work station users recommend a 1 inch thickness for the mat. This style floor mat must be moved when desk is lowered to the sitting position.
- Utilize 7.3.5 Work Surface Basics with sit/stand stations.
- All users of a sit/stand work station should have a proper height measurement conducted by corporate safety. Note: this can be done through pictures.
- Consider the heel height of shoes, as they can change from day to day, when workstation is at standing position.

7.6 Controlling Exposures

VDT operators often spend hours without moving from their chairs. This can lead to tense muscles and poor circulation. The continuous stress on wrists and arms can result in inflammation of tendons, which may pinch nerves to cause numbness and pain.

Detachable keyboards and height-adjustable tables and chairs can help prevent neck, back, and arm discomforts. Flexibility is the key: workers should not have to adjust their bodies to fit VDTs.

Stress causes changes in your body such as making your heartbeat faster, breathing more rapidly and breaking into a sweat. These changes can lead to headaches, muscle tension, neck or back aches, etc., which are the same symptoms of discomfort when using your VDT equipment improperly. By understanding the nature and cause of stress, you can better control your VDT work situation. Proper exercise and a good diet help your body cope with stress. There are also many relaxation exercises that you can use to help minimize stress. Something as small as breathing deeply and stretching exercises to relax tensed muscles can bring your body the relief it needs to rejuvenate. Once the stress factor is identified, you can then begin changing these conditions to help lessen your stress.

7.7 Training

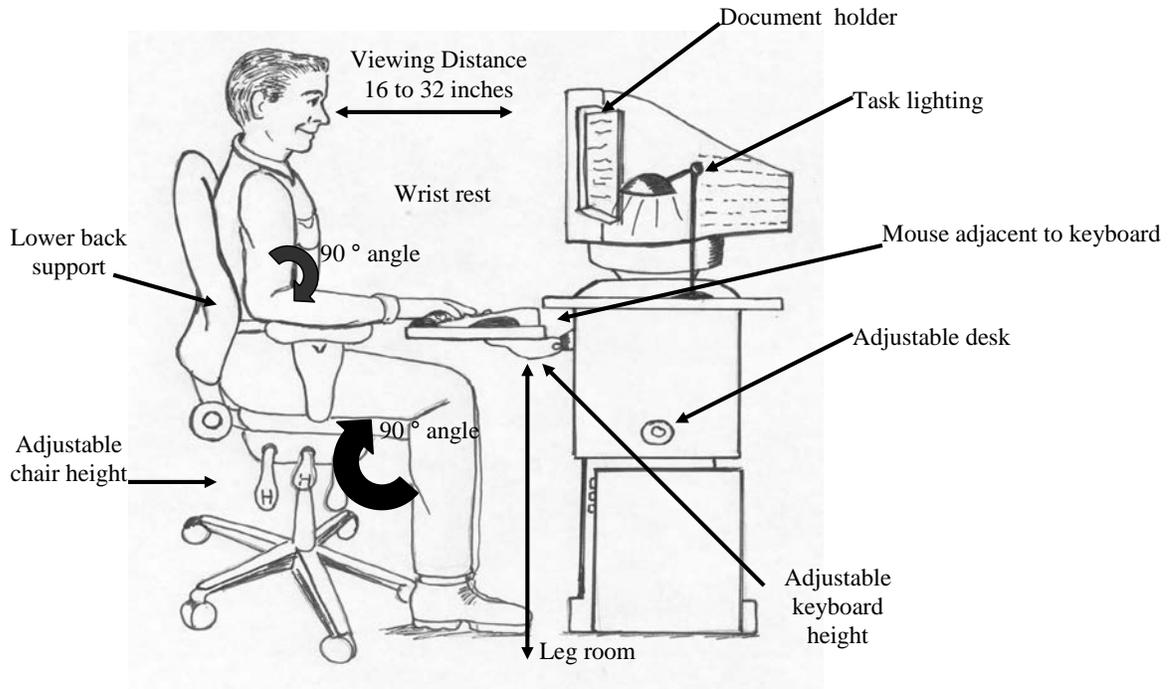
Our annual VDT training consists of an online training program (Ergonome). This web based training experience gives team members a virtual tour through the training and it will prompt users to take a multiple-choice test. In order to complete the training users must pass the test with 100%. It will not log them into the tracking system as completed until they pass.

Corporate safety also conducts ergonomic evaluator training as needed. This training teaches team members how to conduct an ergonomic evaluation on VDT terminals. It is imperative in an office environment to have a proper set up. The ergonomic evaluation form can be obtained through corporate safety. Once a trained team member is an evaluator, he/she can use the evaluation to walk through all the areas of a VDT set up and make changes to improve the workspace.

For further information regarding protective measures, proper use of your VDT or training, please contact the corporate safety department.

7.8 Safety At Home

When setting up your VDT station at home take all the considerations below.



8 Budget / Approval Process

8.1 It is the responsibility of each office location to procure and provide all VDT PPE requirements under this policy and to allow time for the mandatory annual training.

9 Related Documents

9.1 Document available on Cianbro.net

Cianbro Stretches Poster

Policy Number 004**Authorized By:** Michael W. Bennett**Title:** Excavation Safety**Effective Date:** 01/01/75Page 1 of 17

1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 This safety policy and procedure outlines planning considerations applying to all open excavations made in the earth's surface. Our primary objective is to prevent team member exposure to excavation hazards such as cave-ins, equipment or material that could fall/roll from an excavation face, and the collapse of adjacent structures.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Benching (Benching System): Method of protecting team members from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- 4.2 Cemented soil: a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.
- 4.3 Cohesive Soil: Clay (fine grained soil), soil with high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical side slopes, and is plastic when moist. Cohesive soil is hard to break up when dry and sticks together when submerged. Cohesive soils include clay silt, sandy clay, silty clay, clay and organic clay.
- 4.4 Competent Person: Capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measures to eliminate them; must be experienced and knowledgeable in OSHA excavation standards.
- 4.5 Confined Space: A confined space is any space having limited means of egress, not normally team member occupied. This could be subject to accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Confined spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines and open top spaces more than four (4) feet in depth such as excavations, pits, tubs, vaults and vessels.
- 4.6 Dry soil: A soil that does not exhibit visible signs of moisture content.
- 4.7 Excavation: Any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal.

- 4.8 Fissured: A soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks in an exposed surface.
- 4.9 Granular: Gravel, sand or silt (coarse-grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.
- 4.10 Layered System: Two or more distinctively different soil or rock types arranged in layers. Seams or weakened planes in rock or shale are considered layered.
- 4.11 Moist soil: A condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.
- 4.12 Plastic: A property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.
- 4.13 Soil classification system: For the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.
- 4.14 Stable Rock: Is a natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.
- 4.15 Submerged Soil: A soil that is underwater or is free seeping.
- 4.16 Type A Soil: Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soil or clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:
- The soil is fissured; or
 - The soil is subject to vibration from heavy traffic, pile driving from heavy traffic, pile driving, or similar effects; or
 - The soil had been previously disturbed; or
 - The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
 - The material is subject to other to other factors that would require it to be classified as a less stable material.
- 4.17 Type B Soil:
- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
 - Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
 - Previously disturbed soils except those, which would otherwise be classed as Type C soil.
 - Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
 - Dry rock that is not stable; or
 - Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.
- 4.18 Type C Soil:
- Cohesive soil with and unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
 - Granular soils including gravel, sand, and loamy sand: or
 - Submerged soil or soil from which water is freely seeping: or
 - Submerged rock that is not stable, or

- Material in a sloped, layered system where the layers dip into the excavation or slope of four horizontal to one vertical (4H:1V) or steeper

5 Policy

- 5.1 Team members and subcontractors working around excavations will be protected from cave-ins, vehicular traffic, and other excavation related hazards. All excavation work will meet the requirements of this policy and of 29 CFR 1926 Subpart P – Excavations.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 Corporate Safety is responsible for maintaining this document.

7 Excavation Safety Index

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7.1 Site Evaluation and Activity Planning

7.1.1 Prior to starting any excavations, the location of underground installations must be determined and the site must be checked by a competent person for other potential hazards. Reference below and excavation planning checklist found on Cianbro.net.

- A Cianbro competent person shall meet OSHA's definition of a competent person, plus be knowledgeable of the OSHA excavation/trenching standards, Cianbro's excavation Safety Policy and Procedure and have successfully demonstrated such experience. Cianbro's job site management teams have the responsibility to determine which of our team members meet the requirements of a competent person on their site. The competent person must conduct inspections of all excavations and document the results daily.
- Check for electrical power lines (overhead and buried), natural gas and water lines and all other installations. Contact the utility company(s) and call Dig Safe in your area. The number for Dig Safe in ME, NH, VT, MA, and RI is 1-888-DIG-SAFE. See page 6 of this Safety Policy and Procedure for other state contact numbers. If, after following the Dig Safe requirements and contacting the utility companies, the exact location of the underground installations is not established, we may proceed with extreme caution provided detection equipment or other acceptable means to locate the utility installations are used.
- Testing should be conducted for air contaminants (oxygen levels, flammable gases, etc.) and ventilation should be provided where necessary. The soil should also be tested for possible contaminants and hazardous materials.
- Potential falls greater than 6 feet.
- Excavations greater than four (4) feet deep shall be considered a confined space, which requires following Cianbro's Confined Space Entry Safety Policy and Procedure. Included in this safety policy and procedure is a requirement for air monitoring for air quality.

7.1.2 Develop a written activity plan using the checklist provided in this safety policy and procedure as guidance.

7.2 Exemptions from Excavation Protection Systems Requirements

7.2.1 There are two situations where protective systems are not required:

- If the excavation is made entirely in "stable rock".
- If the excavation is less than five (5) feet in depth and examination by a competent person provides no indication of a potential cave in.

7.3 Soil Classifications

7.3.1 Soils are classified into four (4) types:

- NATURAL solid mineral material (rock)
- Type A soil
- Type B soil
- Type C soil

7.3.2 VISUAL AND MANUAL TESTS should be conducted as specified in OSHA regulations to determine soil type.

7.3.3 However, most soil conditions we encounter are worst case type C. If we follow the maximum allowable limits specified (table B-1.3 attached) for sloping, benching, shielding or shoring then VISUAL and MANUAL tests are not necessary.

NOTE: If it is not possible to follow table B-1.3 in performing your excavation activities, refer to OSHA 1926.650 subpart P for soil class descriptions and visual and manual test guidelines.

7.4 Sloping/Benching and Shielding/Shoring Options

7.4.1 Maximum allowable OSHA limits for sloping require an angle not steeper than one and a half (1 1/2) horizontal to one (1) vertical [34° (thirty-four degrees)]. This 34° sloping is normally used for protection in type C soils. Cianbro typically treats the soil as Type C.

7.4.2 Lesser slopes and benching are allowed but require visual and manual soil type identification and are allowed only in Type A and B soil. Competent persons can conduct soil testing.

7.4.3 Other protection systems (shielding/shoring) require approval and/or designs by a registered professional engineer. Trench boxes require you to have the manufacturer's engineering data on site.

7.5 Call Before You Dig Law

Each state has its own versions of the law that requires an excavator to call the local One Call agency (Dig Safe, Dig Safely, Miss Utility) three business days (add another day for major holidays) prior to the start of any excavation on public or private land. The excavator can also call 811 from anywhere in the country and the call will be routed to your local One Call Center. Tell the operator where you're planning to dig, what type of work you will be doing and your affected local utilities companies will be notified about your intent to dig. In a few days, they'll send a locator to mark the approximate location of your underground lines, pipes and cables, so you'll know what's below - and be able to dig safely. Failure to comply establishes legal negligence on the part of the excavator and is subject to a fine (up to \$5000 per violation) along with liability for all damages and injuries that may ensue. Specifically the law requires:

- Premark the excavation area in white paint. Include the name or initials of your company.
- Call the local One Call agency or dial 811 three business days prior to start of excavation and they will issue a reference number that indicates you have complied with the law. If you have not pre-marked the area a "V" will be prefixed to your reference number indicating that you are already in violation.
- Contact any utility that is not a member of the One Call agency.
- Wait 72 hours before excavation begins (3 business days). This waiting period can be waived by the One Call agency only in emergencies.
- The excavator must maintain the "locates" by some appropriate means. If the marks are lost, re-notify the One Call agency.
- If a line is damaged, disturbed, or if the lines were improperly marked you must report it.
- Remember that the utilities will not mark areas on private property. You are responsible to ensure all underground utilities are identified prior to digging by using client provided information or hiring a private locating service.

The One Call agency permits are usually valid for 30 days and you must re-notify at day 27 to avoid waiting additional hours to continue. This does not replace excavation permits that are currently required by local ordinances. Do not assume that owners and subcontractors are in compliance with the law but instead make certain that the One Call agency is notified.

7.6 Basic Excavation Requirements

The following applies to all excavations:

- Identify/assign competent person.
- Identify, locate, and have marked underground/overhead utilities. Call Dig Safe or equivalent. Use a private locator if digging on private property.
- Identify stability of adjacent structures.
- Consider exposure to personnel, equipment and vehicle traffic. Use flagging, stop logs or other barricades to control the hazard.
- Materials, equipment, loose rocks/soil, and spoil piles must be more than 2' from excavation edge.
- Detailed written emergency procedure needed to address rescue in case of cave in.
- Fall protection must be provided if greater than 6' into excavation and not sloped or benched (ie. Into trench boxes, shored trenches or straight sided excavations). Provide guardrails or other form of fall protection. If trench crossings are used, then they must be provided with handrails.

The following only applies when people enter the excavation:

- Determine if excavation is exempt from OSHA requirements for protective systems.
- Identify soil conditions/type. Standard practice is to follow Type C soil requirements.
- Track weather conditions for duration of excavation.
- Check for surface water or high ground water table.
- Identify protective systems needed.
- If 20' or greater in depth, a professional engineer is needed to design cave in protection.
- Treat excavation as a confined space if greater than 4' deep
- Team members must be protected from water accumulation. Shields or dewatering may be necessary.
- Check for surface encumbrances (signs, poles).
- Team members not allowed to work under loads of digging equipment which could fall on them.
- Competent person required to conduct and document daily inspections.
- Access and egress points are required no farther than 25' of lateral travel from any team members (i.e.: ladders, stairs, or ramps - ramps must be designed by a competent person).

We can avoid violations of the law by following the Cianbro Excavation Safety Policy and Procedure in the generation of the Activity Plan. Before you call the One Call agency and as a part of the Activity Plan, be prepared to provide the following information.

Request No.	Time:	Date:
State:	Municipality:	
Location:	Intersecting Street:	
Type of Work:		
Name of Caller:	Title:	
Start Date:	Time:	
Phone Number:	Best Call Back Time:	
Company:	Notified:	
Remarks:		
Excavator Doing Work:		

Note: In those cases where the inspections state agency will not go onto private property, Cianbro project management must coordinate closely with the host/owner to determine locations of underground encumbrances. There are also private companies that will do underground location on private sites. See <http://php1.walkontheweb.com/digsafe/privatelocators.php> for a list of private locating companies.

Note: Project Designers (architects, engineers, etc.) must call area utilities themselves to locate lines (not the One Call agency) and include the location of the lines on the plans.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments.
- 9.2 Documents available on Cianbro.net

Trenching & Excavation Daily Checklist	SD1060
Excavation Planning Checklist	SD1064

Table B-1
Maximum Allowable Slopes

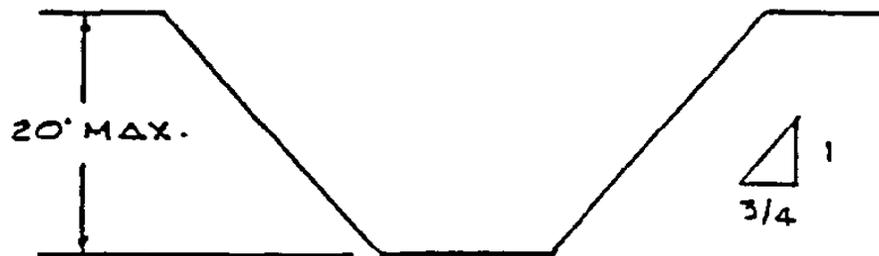
SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) FOR EXCAVATIONS LESS THAN 200 FEET DEEP (3)
STABLE ROCK TYPE A (2) TYPE B TYPE C	VERTICAL (90°) ¾:1 (53°) 1:1 (45°) 1 ½:1 (34°)

NOTES:

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term (open less than 24 hours) maximum allowable slope of 1/2H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 M) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 M) in depth shall be 3/4h:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

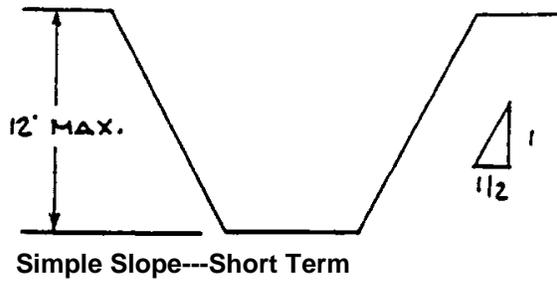
Figure B-Slope Configurations
(All slopes stated below are in the horizontal to vertical ratio)
B-1.1 Excavations made in Type A soil.

All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾ to 1.

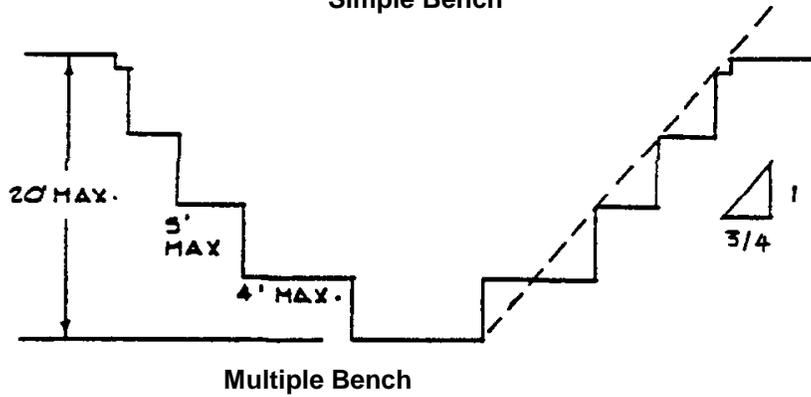
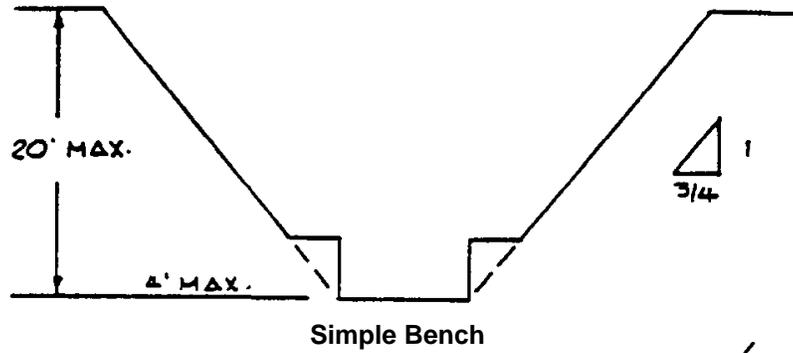


Simple Slope—General

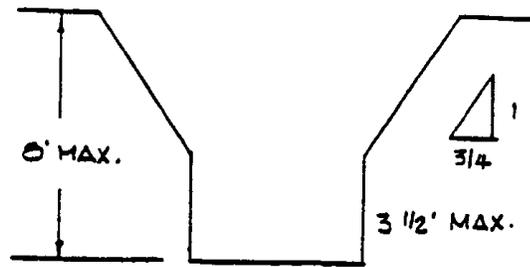
Exception: Simple slope excavations, which are open 24 hours or less (short-term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.



All benched excavation 20 feet or less in depth shall have a maximum allowable slope of $\frac{3}{4}$ to 1 and maximum bench dimensions as follows:

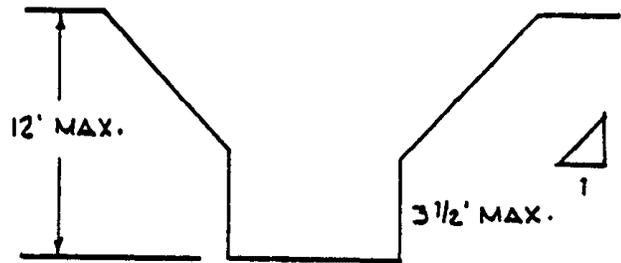


All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3 1/2 feet.



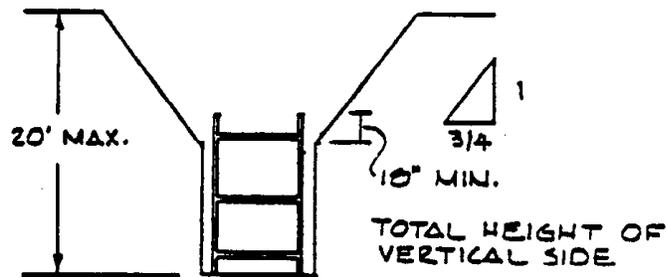
**Unsupported Vertically Sided Lower Portion—Maximum
8 Feet in Depth**

All excavations more than 8 feet but not more than 12 feet in depth which unsupported more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3 1/2 feet.



**Unsupported Vertically Sided Lower Portion—Maximum
12 feet in Depth**

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of 3/4:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

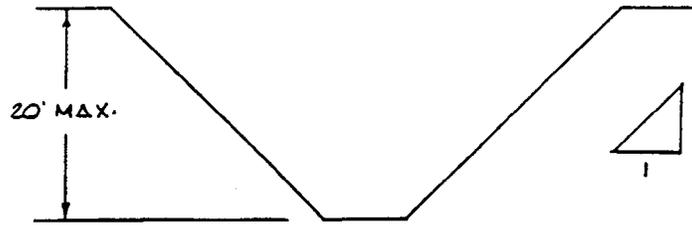


Supported or Shielded Vertically Sided Lower Portion

All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other permitted under § 1926.652 (b).

B-1.2 Excavations Made in Type B Soil

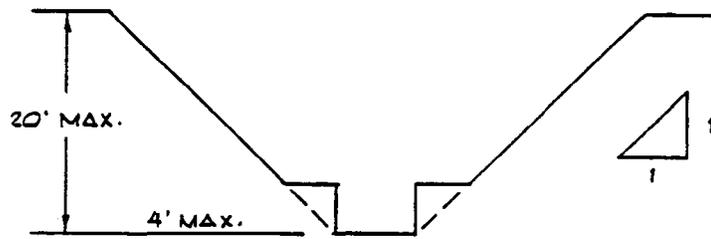
All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1. Shown below.



Simple Slope

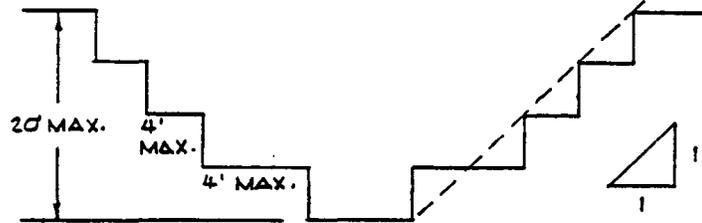
All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimension as follows:

This bench allowed in cohesive soil only. Shown below.



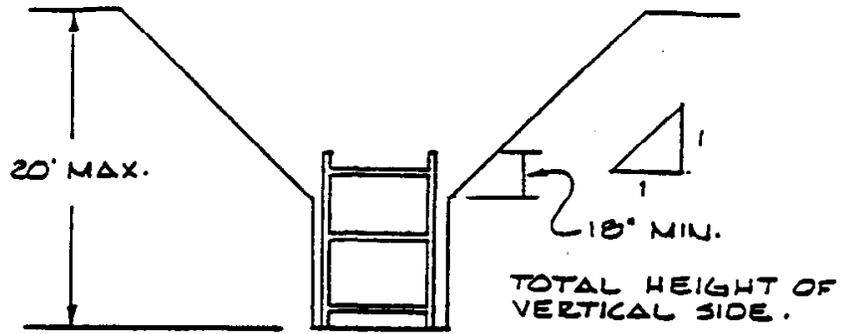
Single Bench

This bench allowed in cohesive soil only. Shown below.



Multiple Bench

All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

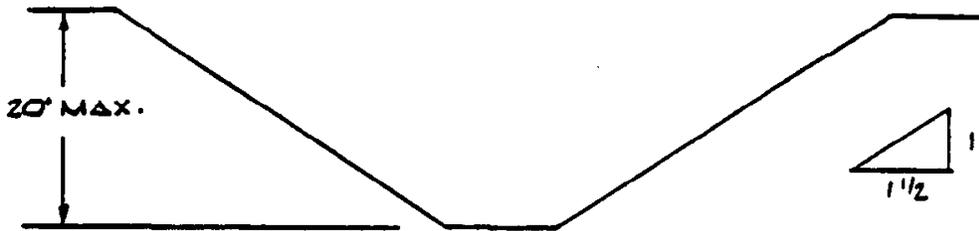


Vertically Sided Lower Portion

All other sloped excavations shall be in accordance with the other options permitted in § 1926.652 (b).

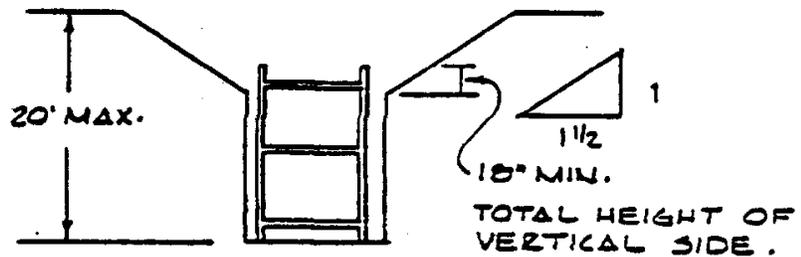
B-1.3 Excavations Made in Type C Soil

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 ½:1.



Simple Slope

All excavation 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1 ½:1.

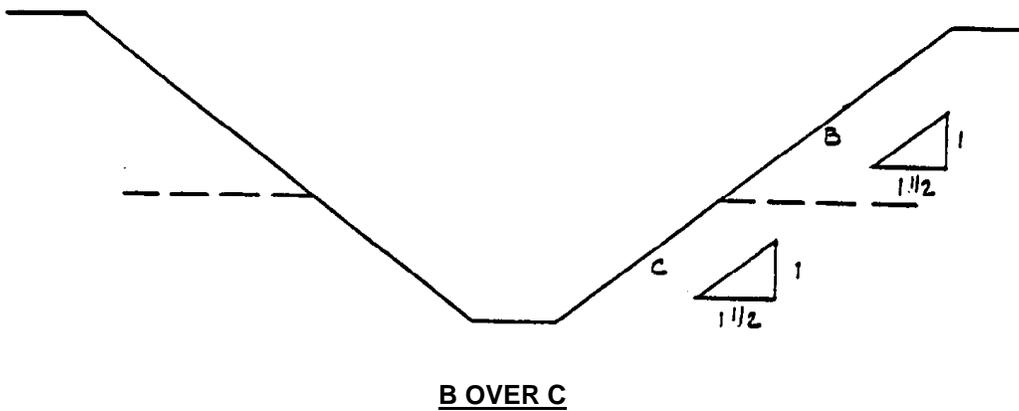
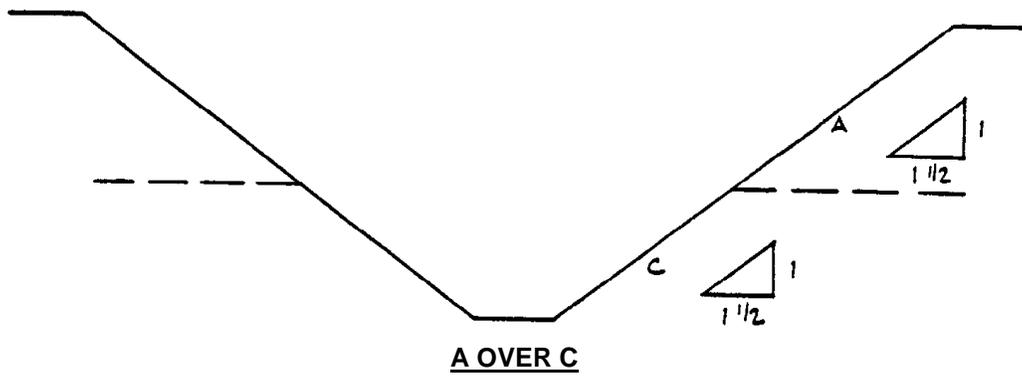
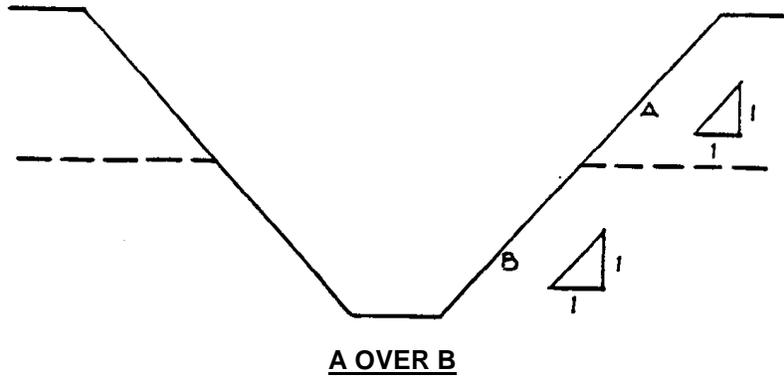


Vertical Sided Lower Portion

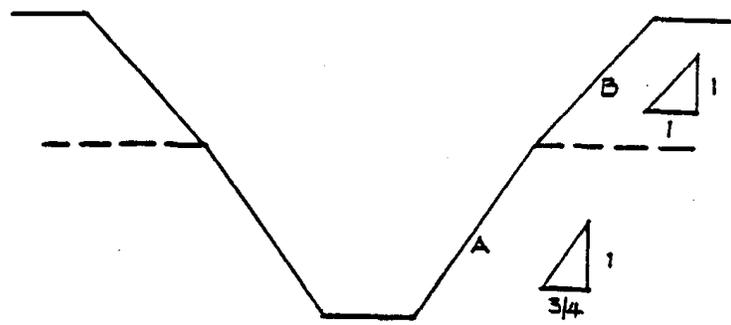
All other sloped excavations shall be in accordance with the other options permitted in §1926.652 (b).

B-1.4 Excavations Made in Layered Soils

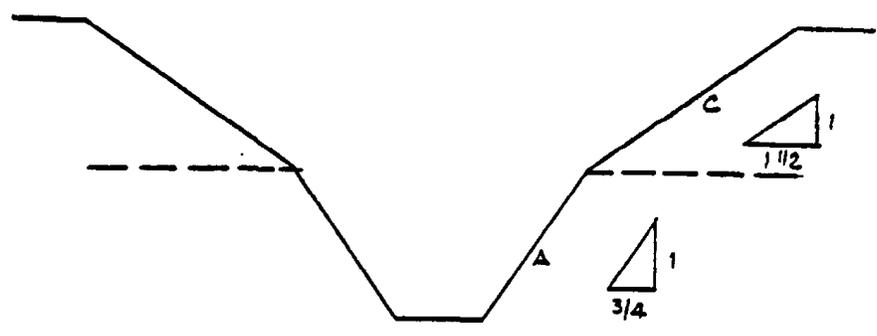
All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



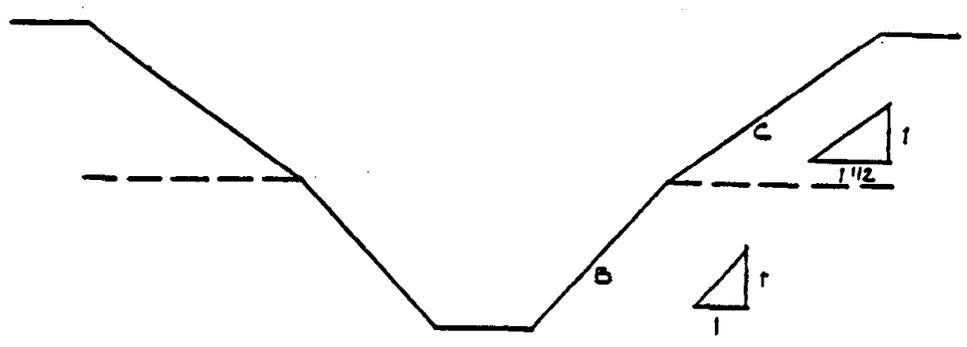
All other sloped excavations shall be in accordance with the other options permitted in § 1926.65 (b).



B OVER A



C COVER A



C COVER B

Subpart P—Selection of Protective Systems

The following figures are a graphic summary of the requirements contained in subpart P for excavations 20 feet or less in depth. Protective systems for use in excavations more than 20 feet in depth must be designed by a registered professional engineer in accordance with § 1926.652 (b) and (c).

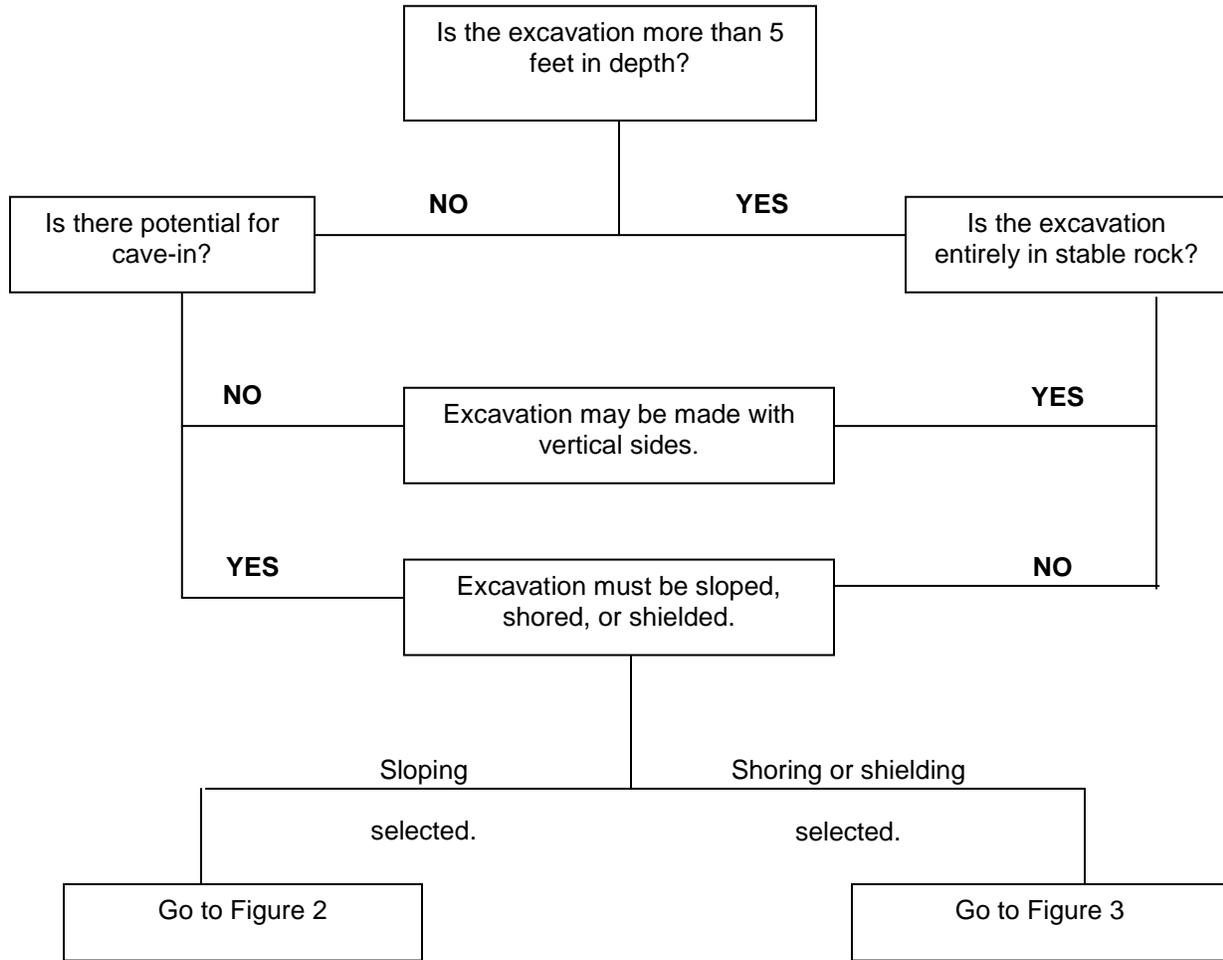


FIGURE 1 – PRELIMINARY DECISIONS

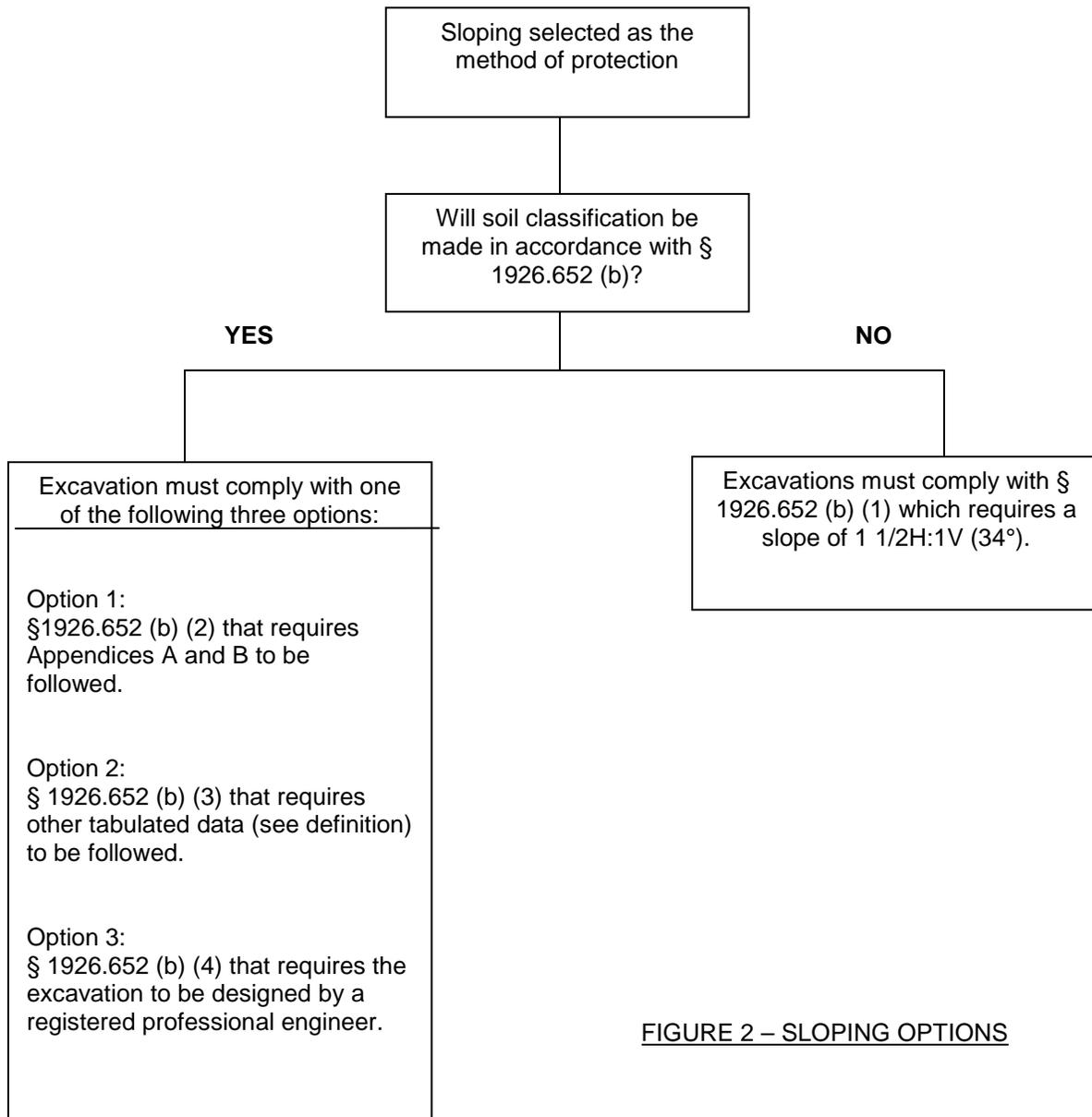


FIGURE 2 – SLOPING OPTIONS

Excavation must be sloped, shored, or shielded.

Shoring or shielding selected as the method or protection.

Soil classification is required when shoring or shielding is used. The excavation must comply with one of the following four options:

Option 1:
§ 1926.652 (c) (1) that requires Appendices A and C to be followed (e.g. timber shoring).

Option 2:
§ 1926.652 (c) (2) that requires manufacturers data to be followed (e.g. hydraulic shoring, trench jacks, air shores, shields).

Option 3:
§ 1926.652 (c) (3) that requires tabulated data (see definition) to be followed (e.g. any system as per the tabulated data).

Option 4:
§ 1926.652 (c) (4) that requires the excavation to be designed by a registered professional engineer (e.g. any designed system).

FIGURE 3 – SHORING AND SHORING OPTIONS

Policy Number: 005**Authorized By:** Michael W. Bennett**Title:** Respiratory Protection Program**Effective Date:** 03/01/75Page 1 of 27

1 Status

- 1.1 Update of existing policy, effective 03/05/15.

2 Purpose

- 2.1 The purpose of Cianbro's Respiratory Program is to **eliminate** airborne hazards from the work environment. The actual use of respirators should be the last resort in all situations. If personal respiratory protection is necessary, Cianbro has specific procedures to ensure that team members are provided, at no cost to them, a medical evaluation to ensure that they are medically approved fit tested, properly equipped with appropriate respiratory protection, and sufficiently trained to use it.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Assigned Protection Factor (APF): The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to team members when the employer implements a continuing, effective respiratory protection program as specified by this section.
- 4.2 Immediately Dangerous to Life or Health (IDLH): An atmosphere that poses an immediate threat to life, or would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.
- 4.3 Maximum Use Concentration (MUC): The maximum atmospheric concentration of a hazardous substance from which a team member can be expected to be protected when wearing a respirator, and is determined by the assigned protection factor of the respirator or class of respirators and the exposure limit of the hazardous substance. The MUC can be determined by multiplying the assigned protection factor (See Table 1 in Appendix H) specified for a respirator by the required OSHA permissible exposure limit, short-term exposure limit, or ceiling limit. When no OSHA exposure limit is available for a hazardous substance, an employer must determine an MUC on the basis of relevant available information and informed professional judgment.
- 4.4 Qualitative Fit Test (QLFT): A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent. Irritant smoke is an example.
- 4.5 Quantitative Fit Test (QNFT): An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

5 Policy

- 5.1 Team members potentially exposed to airborne hazardous materials will be protected by respiratory protection meeting all the requirements of this policy and procedure until the hazard can be controlled by substitution, engineering controls, and administrative controls and it has been verified by air monitoring.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.
- 6.3 The required site program administrator is responsible for determining appropriate respiratory protection and when it is allowed to use disposable respirators (dust masks) on a site.

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7.1 Hazard Elimination

The best way to eliminate respiratory hazards is to plan the work so there is no hazard. Management teams, supervisors, and crews should all contribute to this planning process.

7.1.1 Identify the Hazard

The first planning step is to identify the Respiratory Program Administrator is for the site. This person (usually the safety specialist) must be qualified by training and/or experience in the types of respirators and respiratory hazards present at the site. Next, evaluate the following:

- A. Decide what activities might create or have an existing hazard (chipping concrete, working around lead paint, working in confined spaces, etc.).
- B. Determine the type of potential airborne hazard exposure that exists (gas, dust, fumes).
- C. Evaluate the total environmental contamination this activity might cause (soil, water, neighborhood, etc.)
- D. Assess the area where the hazard might occur:
 1. Is the work area congested with equipment, buildings, people, etc.?
 2. Are there other fumes, dust, or gases to take into consideration?
 3. If outside, are there special weather considerations (wind direction, snow, etc.)?
 4. If indoor, what is the ventilation like?
- E. If appropriate, review hazards/processes with the owner/customer and ensure process management plans are in place.

7.1.2 Create a Plan

There must be a written site-specific respirator plan for each site that uses respirators. It can be one overall plan for the site supplemented by the activity plans or it can be wholly contained as part of the activity plan. After identifying the hazard, the work leaders and first line supervisors, with help from the Program Administrator and safety specialist, will create a plan for their specific work activity that can eliminate and/or significantly decrease the respiratory hazard. The following are some ideas:

- Enclose or confine the activity.
- Ventilate/improve the ventilation in the work area.
- Use a less toxic material.
- Wet down any surface where the work creates airborne dust.
- Consideration of specialty equipment (example: needle guns or grinders with HEPA filters).

- 7.1.3 Planning your work is the best way to eliminate respiratory hazards from the work environment. Airborne dangers in any activity can be controlled when thought through and planned out before the work begins.
- 7.1.4 Your plan must also include information on the number(s) of and type(s) of respirator(s) to be worn for the job and in emergency and rescue work for that work area. The plan must give an analysis of the emergency and rescue uses of respirators for each operation. See section 9.4 Appendix D for a template to help develop this plan.

7.2 Monitoring

- 7.2.1 The purpose of monitoring an activity is to detect and to record any oxygen deficiencies, flammable atmospheres, and/or airborne contaminants in the environment. It is important to Cianbro's Respiratory Protection Program for several reasons:
- Monitoring serves as a check on how effective a jobsite's plan is in eliminating the respiratory hazard.
 - Monitoring provides legal documentation on the actual team member and/or environmental exposure to airborne contaminants.
 - If the controls do not eliminate and/or sufficiently reduce the hazard, monitoring indicates what strength and type of protection (half-face respirator, PAPR, or supplied air) the team members need or verifies that the appropriate level of PPE is being used

7.3 Medical Approval

- 7.3.1 Using personal respiratory protection is a last resort. It is required, though, if there is no reasonable way to eliminate the airborne danger, or if the monitoring results show that the contamination still exists above the Permissible Exposure Limit (PEL) or until the effectiveness of the engineering and administrative controls have been tested.
- 7.3.2 The first step in personal respiratory protection is Medical Approval - deciding whether or not a person is physically able to wear a respirator. The medical approval process must be confidential, during normal work hours, convenient, understandable, and the team member must be given an opportunity to discuss the results with the physician or another licensed health care professional. Cianbro team members must be medically approved annually by Cianbro's medical director, either with or without modifications (see form SD997 available on Cianbro.net>Standard Operating Procedures – on the SOP or Quantitative Respirator Fit Test Results (printout from fit test machine) for explanation of the work modifications), on each of the following items before they can be fit tested or wear personal respiratory protection.
- Medical Questionnaire: The medical questionnaire is a confidential document where team members answer questions about their medical history and respiratory health. This form must be completed annually by the team member and sent to Occupational Medical Consultants to be reviewed by Cianbro's Medical Director.
 - Pulmonary Function Test (PFT): The PFT is an actual test of lung capacity. Cianbro requires updates and approval of this test every three years. Annual medical questionnaires are normally completed at the time of the PFT. The initial medical approval to wear a respirator does not require a PFT. The PFT is no longer done as part of the pre-employment physical. It is expected to be done during the annual hearing van trip. If a PFT has not been done by year three, a team member will no longer be approved by Cianbro's medical director to wear a respirator until the PFT is done.
 - Follow-Up Medical Evaluation: Follow-up medical evaluations are necessary whenever a team member shows a possible problem from the medical questionnaire review or fails the PFT. The retest involves a medical evaluation.

Team members must pass their follow-up evaluation, with or without modifications, before they can wear a respirator.

- 7.3.3 A team member must be medically re-evaluated regardless of the time period since the team member was previously evaluated if the team member reports signs or symptoms that are related to his/her ability to use a respirator. They also must be re-evaluated if a supervisor or safety specialist, etc. believe that the team member should be re-evaluated because of trouble breathing, claustrophobia, etc. including conditions observed during fit testing.
- 7.3.4 Cianbro team members receive a medical respiratory evaluation during the pre-placement, nuclear, and annual (operator, pilot, truck driver, and diver) physicals. Cianbro annually conducts on-site PFTs/Medical Questionnaires/Fit Testing as needed to update team member medical approvals.
- 7.3.5 The team member Respiratory Status Report is available through the computer (individual team members can also be looked up through CMiC). This report lists current respiratory status (test results), respirator size and indicates if there are any work modifications for Cianbro team members who are listed on the Occupational Health Report. These modifications consist of what types of respirators a team member can wear and at what exertion levels s/he can wear the respirator. See section 9.4 Appendix D for an explanation of exertion levels.
- 7.3.6 NOTE: If the Cianbro medical director determines that a team member cannot use a negative pressure respirator but could wear a powered air-purifying respirator (PAPR), then the job site must provide a PAPR.
- 7.3.7 Team members who will be expected to wear respirators in IDLH conditions must have additional approval by the Cianbro medical director.

7.4 Respirator Selection

Team members should select a respirator that adequately protects against the degree of their exposure to dust, fumes, or chemicals. The degree of protection needed depends upon the degree of exposure. The respirator and all components used with it must be approved by the National Institute for Occupational Safety and Health (NIOSH) for use in that configuration. The selection of a proper respirator for any given situation shall require consideration of the following factors:

7.4.1 The Nature of the Hazard(s)

The nature of the hazard shall include such factors as:

- Type of hazard (oxygen deficiency, contaminant)
- Physical properties
- Chemical properties
- Physiological effects on the body
- Established PEL (even if there is no PEL, Cianbro is required to protect their team members) or other established limit that is more protective (TLV, REL, etc.)

7.4.2 The Characteristics of the Hazardous Operation or Process

These characteristics shall include such factors as:

- Operation or process characteristics
- Work-area characteristics
- Materials, including raw materials, end products, and by-products

Remember that changes in the operations or processes may change the hazard and may require the selection of a different respirator.

7.4.3 The Location of the Hazardous Area with Respect to a Safe Area Having Respirable Air

This must be considered, since it will permit planning for the escape of workers if an emergency occurs, for the entry of workers to perform maintenance duties, and for rescue operations.

7.4.4 A Reasonable Estimate of Team Member Exposure

If you cannot reasonably estimate the team member exposure, you must consider the atmosphere to be IDLH. Initial monitoring of a respiratory hazard can aid in selecting the appropriate respirator. Historical data from essentially similar operations may be used to make this required initial exposure assessment.

- 7.4.5 The Activity of Workers in the Hazardous Area
Factors to consider are whether the worker is in a hazardous area continuously or intermittently during the work shift and whether the work rate is light, medium, or heavy.
- 7.4.6 The Physical Characteristics, Functional Capabilities, and Limitations of Respirators of Various Types.
- 7.4.7 The Respirator-Protection Factors and Respirator Fit
A respirator protection factor is a measure of the degree of protection provided by a respirator to a wearer. A protection factor assigned to a respirator gives the maximum concentration of the hazardous substance in which the respirator can be used. The limitations of the cartridges, filters, and canisters shall also be considered when referring to the protection factors.
- 7.4.8 Respirator Types
The most common types of respiratory protection used on Cianbro projects are half-face masks, Powered Air Purifying Respirators (PAPRs), disposable respirators, and supplied air respirators. Note: Refer to section 9.6 Appendix F Table 1 for all the assigned protection factors and for notes concerning their use.
- A. Half-Face Respirators:
Half-face masks are the lowest level of respiratory protection allowed at Cianbro when the contaminant(s) is/are present near/or above the PEL. Dust masks (also called filtering face piece respirators) are not an option because of the difficulty of doing the required face seal checks each time the respirator is put on. Half-face respirators provide a 10xPEL protection factor. Cianbro currently offers several brands of half-face masks to standardize respirator selection across projects: MSA combo II, MSA Combo Elite, AO 5-Star, 3M and North 7700. These respirators are all available in small, medium and large sizes. Projects should contact the Safety Department if they would prefer another respirator brand.
- B. Full Face Tight Fitting Negative Pressure Respirators
Tight fitting full face piece respirators used with cartridges have an assigned protection factor of 50xPEL if the respirator has been quantitatively fit test. It only has an APF of 10xPEL if qualitatively fit test. Full-face piece respirators have the additional advantage of preventing eye injuries.
- C. Powered Air-Purifying Respirators (PAPRs)
PAPRs provide 1000xPEL protection factor with a tight fitting full-face piece. In addition, their battery-charged pump blows cool air on the team member's face while they work. The PAPR provides substantial respiratory protection while also being comfortable to wear.
- D. Supplied Air Units should be used for maximum respiratory protection. SARs with full face pieces provide 50xPEL (Operated in demand mode) up to 1000xPEL (Operated in pressure demand or continuous flow modes). Please call Corporate Safety Department with any questions about what type of respirator you should select for an activity. *Always know a respirator's limitations.*
- E. Disposable Respirators (i.e. filtering face piece respirators)
Voluntary use of disposable respirators is allowed if all the following conditions are met:
- The safety specialist or project manager has given permission.

- The atmosphere is understood and the contaminant(s) present is/are below published safe limits. If the atmosphere has not been evaluated, higher levels of respiratory protection must be used.
- Any filtering face piece respirator that is NIOSH approved may be used.
- The use does not contribute to any additional health hazards.
- You provide the team member with information contained in 1926.134 Appendix D.
- The above information is documented.
- Filtering face piece use must be controlled (typically by safety) on the job site to ensure that team members are not at risk because of using these respirators in situations where they are not appropriate and also that the requirements of this section are met. (list continues on pg. 7)
- Though a beard interferes with the effectiveness of a filtering face piece (or any other type) respirator, a team member is not required to be clean shaven when using a filtering face piece respirator in a voluntary situation when the atmosphere is known to be below published safe limits. In all other situations, team members must be clean-shaven!
- Oxygen Deficient and any other IDLH Atmosphere
Air with oxygen content of below 19.5% by volume is considered to be IDLH. You must use the following respiratory protection for IDLH atmospheres: Full-face piece pressure demand SCBA or combination full face piece pressure demand-supplied air respirator with auxiliary self-contained air supply.

7.5 Respirator Fitting

- 7.5.1 Cianbro team members that are medically approved, with or without modifications, must be individually fit, prior to initial use and annually thereafter if they wear any tight fitting respirators (full face or half face, cartridge, canister, filter respirators, SCBA, supplied air respirators, etc.). This "fit test" ensures team members' respirators are comfortable and have an adequate seal around the face. Please note: All team members must be clean-shaven before being fit to a respirator. The wearer of a respirator equipped with a full face piece, helmet, hood, or suit is allowed to wear contact lenses but must move to an uncontaminated area if they have to remove the respirator for any reason.
- 7.5.2 If a spectacle, goggle, face shield, or welding helmet must be worn with a face piece; it shall be worn so as not to adversely affect the seal of the face piece to the face. Special prescription respirator glasses can be purchased for use with full-face respirators.
- 7.5.3 Team members must be clean-shaven to the point that no facial hair comes between the respirator face piece sealing surface and the skin of the face or that interferes in any way with the proper functioning of the respirator (e.g. interferes with the valve functioning).
- 7.5.4 For the full-face respirators (MSA brand) we primarily use, you need only to fit test to one version (i.e. PAPR, supplied air, etc.) and the team member can wear the same size of the other versions from the same manufacturer. Refer to table 1 below. Each row contains respirators that are equivalent as far as fit testing is concerned. *If you are fit test to any one of the respirators in the row you can wear any other respirator of the same size in that same row.* For questions or information on other brands contact the Manager of Health and Environmental Hazards or contact the Manufacturer directly. If you are using any other full face piece respirator, you must be fit test to that specific brand and type.

Table 1 - MSA Equivalent Respirators For Fit Testing

Manufacturer	Full face with cartridge/canisters	PAPR	Supplied air or SCBA
MSA	Ultra-Twin	Optimair 6A w/ Ultravue face piece	PremAire w/ Ultravue face piece
	Gas Mask Style (Chin Type, Super-Size, Industrial-Size, or Type N)	Optimair MM w/ Ultravue face piece	Any MSA SCBA w/ Ultravue face piece
MSA	Ultra Elite w/ Twin Cartridge adapter	Optimair 6A w/ UltraElite face piece	PremAire w/UltraElite face piece
		Optimair MM w/ UltraElite face piece	Any MSA SCBA w/ UltraElite face piece
MSA	Advantage 1000	No equivalent	No Equivalent

There are two types of respirator fit tests used in Cianbro - quantitative and qualitative:

7.5.5 Quantitative Fit Test (QNFT):

- The quantitative fit-test is the most accurate type of fit test. In this test, a controlled negative pressure (CNP) machine made by Dynatech statistically evaluates a respirator's fit while the wearer does various activities. Section 9.2 Appendix B contains a copy of the instructions for performing a quantitative fit-test. Note: Portacount fit test machines are also allowed for quantitative fit testing.
- If quantitative fit testing is used for tight fitting air-purifying half mask respirators, the test subject must not be permitted to wear it unless a minimum fit factor of 100 is obtained. The respirator may not be worn in concentration greater than ten (10) times the hazardous exposure level regardless of the measured fit factor.
- If quantitative fit testing is used for tight fitting air-purifying respirators with full face piece, the test subject must not be permitted to wear it unless a minimum fit factor of 500 is obtained. The respirator may not be worn in concentrations greater than fifty (50) times the hazardous exposure level regardless of the measured fit factor.
- When quantitative fit testing is performed on tight fitting atmosphere-supplying respirators and tight fitting power air-purifying respirators, only the face piece must be tested without any air-supplying equipment or attachments (i.e. in a negative pressure mode). This may be accomplished by testing a respirator face piece of the same make, model and size, which is equipped for cartridges/filters or with a special adapter that fits where the hose connects. The minimum fit factor obtained must be 500. The respirator will be assigned a protection factor as per NIOSH or the OSHA substance specific standard that applies.

SPECIAL NOTE: Persons performing a QNFT must be able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly if necessary and assure that test equipment is in proper working order.

7.5.6 Qualitative Fit Test (QLFT):

- The qualitative fit test should only be done when the CNP machine is not available. This test involves squirting irritant smoke around the respirator to see if the wearer can smell the smoke. If the team member does not smell anything, then the respirator is an adequate fit. Section 9.2 Appendix B contains a copy of the instructions for performing a qualitative fit test. Other methods using other challenge agents beside irritant smoke are allowed. Contact Corporate Safety and reference Appendix A of 1910.134.

- If qualitative fit testing is used for tight fitting air-purifying respirators with half mask or full face piece, it can only be worn in atmospheres no greater than ten times the permissible exposure limit (PEL).
- When a qualitative fit test is performed on tight fitting atmosphere-supplying respirators and tight fitting powered air-purifying respirators, only the face piece must be tested without any air-supplying equipment or attachments (i.e. in a negative pressure mode). This may be accomplished by testing a respirator face piece of the same make, model and size which is equipped with appropriate air-purifying cartridges/filters, with a special adapter, or in the case of MSAs with a PAPR cartridge mounted in place of the hose.

7.5.7 Respirator Fit Test Records

Records of respirator fit tests must be kept for at least the duration of employment. These records, at a minimum, must include the information below. Form SD997 Qualitative Fit Test Report or Quantitative Respirator Fit Test Results (printout from fit test machine) must be completed and a copy forwarded to corpsafety.com.

- Name and team member ID number of person tested
- Name of test operator
- Type of respirator fit test performed
- Specific make and model of respirator tested
- Date of test
- Results of respirator fit test.

Success or failure of person to obtain satisfactory fit if a qualitative respirator fit-test was performed.

Respirator protection factor based upon test results if a quantitative respirator fit test was performed. Keep a copy of the printout and have the team member sign it.

Respirators that cannot be properly quantitatively or qualitatively fit tested for that individual shall not be used. Team members can only use the make, size, and style of respirator that they were fit test to.

7.6 Respirator Limitations

7.6.1 Air/Atmosphere Supplying Respirators

A. Self-Contained Breathing Apparatus (SCBA)

- Limitations: The period over which the device will provide protection is limited by the amount of air or oxygen in the apparatus, the ambient atmospheric pressure (service life of open-circuit devices is cut in half by doubling of the atmospheric pressure), and the type of work being performed. Some SCBA devices have a short service life (less than 15 minutes) and are suitable only for escape (self-rescue) from an IDLH atmosphere.
- Chief limitations of SCBA devices are their weight or bulk, or both, limited service life, and the training required for their maintenance and safe use.

B. Supplied-Air Respirators

- Limitations: Their use is limited in atmospheres from which the wearer can't escape unharmed without the aid of the respirator. The wearer is restricted in movement by the hose and must return to a respirable atmosphere by retracing his/her route of entry. The hose is subject to being severed or pinched off. Cannot be used in IDLH atmospheres.
- Airline respirators provide no protection if the air supply fails. Some contaminants, such as tritium, may penetrate the material of an airline suit and limit its effectiveness. Other contaminants, such as fluorine, may react chemically with the material in an airline suit and damage it.

C. Combination Airline Respirators with Auxiliary Self- Contained (SC) Air Supply

- This device with auxiliary self-contained air supply (i.e. an escape bottle) is approved for escape and may be used for entry when it contains at least a 15-minute auxiliary self-contained air supply. Can be used in IDLH atmospheres.

7.6.2 Air-Purifying Respirators General

Limitations: Air-purifying respirators do not protect against oxygen-deficient atmospheres or against skin irritation from, or absorption through the skin of, airborne contaminants. They cannot be used in IDLH atmospheres. The time period over which protection is provided is dependent on the canister, cartridge, or filter type; concentration of contaminant; humidity levels in the ambient atmosphere; and the wearer's respiratory rate.

A. Vapor and Gas-Removing Respirators

- Limitations: No protection is provided against particulate contaminants. A rise in canister or cartridge temperature indicates that a gas or vapor is being removed from the inspired air. Not for use in IDLH atmospheres. Not recommended for contaminants that lack adequate warning properties (odor, taste, or irritation) that warn you if a contaminant has breached your respirator.
 - Full Face piece Respirator (including powered air purifying respirators)
 - Half-Mask Face piece Respirator
 - Mouthpiece Respirator - Mouth breathing prevents detection of contaminant by odor

NOTE: For all vapor and gas-removing respirators you must do one of the following:

- Use cartridges/canisters that have an end-of-service-life indicator approved by NIOSH for use with the specific chemical, or***
- Implement a change schedule requiring the changing of a canister, cartridge, and/or filter before 80% of the useful life has expired. The change schedule must be based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. You must include the information relied upon as the basis for the change schedule with the activity plan.***

Respirators mentioned above must not be used for a hazardous chemical with poor or inadequate warning properties unless:

- Their use is permitted under a substance specific OSHA standard
- The odor or irritation threshold is not in excess of three times the hazardous exposure level and there is no associated ceiling limit.

B. Particulate-Removing Respirator:

Provides protection against non-volatile particles only.

- Limitations: No protection against gases and vapors. Choose cartridges rated as N100, R100, or P100. N means can't be used in atmospheres that may contain oil, R means can use in atmospheres containing oil for up to eight hours, and P means no limitation based on oil present in the atmosphere. 100 is equivalent to the old HEPA designation.
 - Full Face piece Respirator including powered air purifying respirators
 - Half-Mask Face piece Respirator
 - Mouthpiece Respirator

7.7 Respirator Use

7.7.1 Persons wearing respirators must not be chewing gum, tobacco, or smoking, etc.

7.7.2 A positive/negative pressure face seal check is required by OSHA every time a person puts on a respirator.

- 7.7.3 Positive Pressure Seal Check: Close off the exhalation valve and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air around the edges at the seal.
- 7.7.4 Negative Pressure Seal Check: Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) (for the 3M 6000 HEPA cartridges, block off the center of the cartridge with your thumb), inhale gently so that the face piece collapses slightly, and hold the breath for ten (10) seconds. If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.
- 7.7.5 No one is allowed to remove the respirator while in the area containing the contaminant(s) for which the respirator is being worn. A team member must leave the contaminated area immediately to a safe area and remove the respirator if any of the following occur:
- Breathing becomes difficult (breathing resistance increases)
 - Dizziness or other distress occurs
 - The wearer senses irritation, smells or tastes the contaminant
 - You have reached the end of the scheduled change out period for the cartridge
 - The respirator becomes damaged
 - You need to wash your face or the face piece to prevent skin irritation
 - The air supply fails
 - The air-purifying element has an end-of-service-life-indicator that has changed color to indicate expiration
 - Or anything else occurs which could cause the team member to remove the respirator
- 7.7.6 Team members are not allowed to work in areas that have IDLH atmospheres except:
- Current members of the Confined Space Rescue Team.
 - Team members performing line breaks following Cianbro SPP 055 Line Breaking/Equipment Opening Procedure.
 - All other situations require approval of the VP of HR, Health, Safety & Environmental or designee.
- 7.7.7 The following requirements are mandatory for work in IDLH atmospheres:
- There must be a trained rescue team on standby that meets the requirements Cianbro SPP 19A Confined Space Rescue Team with the appropriate and necessary rescue equipment.
 - For every rescuer that enters an IDLH atmosphere, there must be at least one back up person outside the space with the proper training, PPE, and equipment.
 - Contact must be maintained with the rescuers entering the IDLH atmosphere.
 - Whenever a rescuer enters an IDLH atmosphere, the top Cianbro manager on site must be immediately notified in order to provide any support necessary.

7.8 Respirator Maintenance

The work activity plan must include a program for maintenance and care of respirators and be adjusted to the type of location, work activity, and hazards involved.

It shall include the following basic items (A-D):

7.8.1 Cleaning and Disinfecting

- Respirators that are issued for the exclusive use of one worker will be washed after each day's use, or more often as necessary. Those used by more than one worker will be thoroughly washed and disinfected after each use. See section 9.3 Appendix C for appropriate methods.
- It is recommended that each team member be responsible for the washing and disinfecting of their own equipment. The job site must provide the equipment,

supplies, facilities and on the job time to do the cleaning and disinfecting. Failure to provide these is a violation of the standard.

- Emergency respirators must be washed and disinfected after each use. Emergency respirators must never be found dusty or dirty, establish a periodic washing schedule.
- Use cleaner-sanitizers that contain a bactericidal agent (i.e., quaternary ammonium compound) and 2-minute immersion.

Caution: Strong cleaning and sanitizing agents and many solvents can damage rubber or elastomeric respirator parts. Also, inflammation of the skin of the respirator user may occur if the sanitizing agent is not completely rinsed from the respirator.

7.8.2 Repair

Respirators shall always be in good working order. Only experienced persons must do replacement or repairs with parts designed for the respirator. An experienced person is someone who has received training from the manufacturer or equivalent on respirator repair. In addition, only parts designed for the respirator shall be used. For example, do not use parts from a MSA respirator on a North respirator, or vice versa.

7.8.3 Storage

- Respirators must be stored to protect against damage, contamination, dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. Store the respirator at all times so that the face piece and exhalation valve will rest in a normal position to prevent distortion of the respirator.
- Routinely used respirators may be stored in intact plastic bags or ideally in carrying cases/cartons such as a Tupperware container. Do not store respirators in lockers, toolboxes, or conex boxes unless in a closed, airtight carrying case/carton. Respirators must not be stored with the filters or cartridges still on them because the filters and cartridges contain some of the contaminant in them.
- Emergency respirators should also be stored in closed carrying cases/cartons and be quickly accessible. The storage location of emergency respirators must be clearly marked.

7.8.4 Inspection for Defects

See section 7.9 below.

7.9 Respirator Inspections

7.9.1 Routinely worn respirators must be checked by the user before and after use. Emergency respirators and SCBAs must be checked after each use and at least monthly to assure that they are in satisfactory working condition. The inspection of all emergency respirators and SCBAs must be documented and have a certification tag or label affixed to them noting their last inspection.

7.9.2 Emergency escape only respirators (carried by individual team members) shall be checked before being carried into the workplace.

7.9.3 After cleaning and disinfecting a respirator, the respirator must be inspected to ensure it is in proper working condition.

7.9.4 Respirator and cartridge inspections must include a check of the following:

- Tightness of connections;
- Condition of the face piece, headbands, valves, connecting tubing, and canisters/cartridges;
- Pliability and signs of deterioration of rubber or elastomer parts;
- Ensure air and oxygen cylinders are fully charged;
- Shelf life date(s);
- End-of-service-life indicator;

- Ensure regulator and warning devices work properly;
- PAPR masks do not have any dust, slag, or debris inside that will blow into one's eyes when pump is turned on; and
- PAPR batteries are fully charged.

7.9.5 Respirators that fail to pass inspection must be immediately removed from service.

7.10 Canisters/Cartridge Selection

7.10.1 Identification

- Choose canisters/cartridges based on the type(s) of contaminants and expected level of exposure. Use material safety data sheets, monitoring data, etc. and reference section 9.1 Appendix A of this safety policy and procedure.
- Persons issuing and using a filter, cartridge or canister must ensure that they are color-coded and labeled with the NIOSH approval label and that the label is not removed and remains legible.
- The primary means of identifying a canister/cartridge is by the wording on the label.
- The secondary means of identifying a canister/cartridge is by the color code.
NOTE: DO NOT rely on color code alone to identify a canister.

7.10.2 Replacement

- Cartridges and canisters must be replaced before 80% of their useful service life has expired. You must either use cartridges/canisters with an end-of-life-indicator (ESLI) or develop a change schedule for the cartridges/canisters based on objective information or data to ensure the canisters/cartridges are changed before the end of their useful service life. Include the information relied on with your written site-specific respirator plan.

7.11 SCBAs/Air-lines

7.11.1 Air-line Respirators

- Air Supply - Air supply for airline respirators must be of high purity.
- Compressed gaseous air must be at least Grade D including 19.5%-23.5% oxygen content, 5 mg/cubic meter of air or less of hydrocarbons, 10 ppm or less of carbon monoxide, and 1,000 ppm or less of carbon dioxide and no noticeable odor. You must obtain a certificate of analysis from the supplier showing that the cylinders of breathing air meet the requirements for Grade D breathing air before using the cylinders.
- Liquid air must be Grade B.
- Moisture content shall not exceed 27 ml per cubic meter.
- Pressures - The pressure at the point where the hose attaches to the air supply must not exceed 125 PSI. At the lowest pressure and longest hose length, the device must deliver at least 170 LPM (liters per minute). At the highest pressure and shortest hose length, the flow rate must not exceed 425 LPM. If you have a tight-fitting face piece the equivalent airflows must be 115 LPM and 425 LPM, respectively.
- The pressure must be specified by the manufacturer.
- Hose Length - The hose length for an airline respirator must be specified by the manufacturer, 35 to 300 feet long. Low pressure hose-line length is limited to not more than 300 feet.
- System Components - *The compressor must be constructed and situated so as to avoid entry of contaminated air into the air intake system.* The compressor must be equipped with an in-line air-purifying sorbent bed and filter to assure breathing air quality. It must have alarms to indicate compressor failure or overheating. The system must provide sufficient capacity to enable the wearer to escape the contaminated environment in the event of compressor failure. Cianbro has specially designed 2 and 4 person air-purifying systems for use with compressors (ZEKS).

- For oil-lubricated compressors, a high-temperature alarm and carbon monoxide alarm must be installed.
- Oxygen must not be used with supplied air respirators.
- Breathing air couplings must be incompatible with outlets for non-respirable plant air or other gas systems.
- Air cylinders must be maintained in a fully charged state and be recharged when the pressure drops to 90% of the manufacturer's recommended pressure. Cylinders must be tested in accordance with 49 CFR 178, Shipping Container Specification of DOT.

7.11.2 Self Contained Breathing Apparatus (SCBA)

- Safety Features - Pressure gauges or liquid level gauges visible to wearer to indicate quantity of air or oxygen remaining in the cylinder.
- Remaining service life indicators or warning devices that signal alarm when only 20-25% of service time or service volume remains.
- Bypass valves, in case stage reducers or regulator fails and it is necessary to conserve or provide respirable air.
- Fittings on devices that use compressed or liquid oxygen which are incompatible with compressed or liquid air fittings.
- Always inspect your equipment before using it!

7.12 Emergency Respirators

7.12.1 These are respiratory devices that are designed for use only during escape from hazardous atmospheres.

7.12.2 Table 2 - Selection Options for Escape Respirators should be used to select the appropriate escape apparatus.

Table 2 - Selection Options for Escape Respirators

ESCAPE CONDITIONS	TYPE OF RESPIRATOR
Short distance to exit, no obstacles no oxygen deficiency	Any escape gas mask approved for type of gas encountered. Any escape SCBA having a suitable service life of 3 to 60 minutes. Any acceptable device for entry into emergency situations.
Long distance to exit or obstacles along the way, no oxygen deficiency	Any gas mask consisting of a full face piece approved for type of gas encountered. Any escape SCBA having a 5 to 60 min. service life. Any self-contained self-rescuer having a suitable service life.
Potential oxygen deficiency	Any escape SCBA having a 5 to 60 min. service life. Any self-contained self-rescuer having a suitable service life.

7.13 Training

7.13.1 Who Is Required To Be Trained?

Workers, persons issuing respirators and supervisors must be trained by a qualified person to ensure proper use of respirators.

7.13.2 Training Records

Complete a Cianbro Record of Training and forward a copy to the Corporate Safety Department within two working days from the time training was performed.

7.13.3 Frequency

The employer shall provide the training prior to fit testing a team member or requiring a team member to wear a respirator and annually thereafter. Retraining is required more often than annually when changes in the workplace or type of respirator render previous training obsolete. When inadequacies in the team member's knowledge or use of the respirator indicate that, the team member has not retained the requisite understanding or skill; or when any other situation arises in which retraining appears necessary to ensure safe respirator use.

7.13.4 Training Program

The training program must include "hands-on" activities and be conducted in a way that is understandable to the team member.

7.13.5 Content

- The reasons for the need of respiratory protection and how to select the appropriate respiratory protection.
- The nature, extent, and effects of respiratory hazards (including biological and radiation hazards) to which the person may be exposed.
- An explanation of why engineering controls are not being applied or are not adequate and of what effort is being made to reduce or eliminate the need for respirators.
- An explanation of why a particular type of respirator has been selected for a specific respiratory hazard.
- An explanation of the operation, and the capabilities and limitations of the respirator selected.
- Instruction in inspecting, donning, doffing, cleaning, checking the fit of, and wearing the respirator (hands-on activities).
- Instruction on how to deal with emergency situations or respirator malfunctions.
- Cianbro's Respiratory Protection Program.
- Explanation of the procedures for maintenance and storage of the respirators.
- Explanation of how improper fit, usage, or maintenance of the respirator can compromise the protective effect of the respirator.
- The general requirements of the OSHA standard (The employer's obligation to: develop a written program, properly select respirators, evaluate respirator use, correct deficiencies in respirator use, conduct medical evaluations, provide for the maintenance, storage and cleaning of respirators, and retain and provide access to specific records).

Before team members use a respirator on a job site you must ensure that they understand the above information for the specific respirator they are using and the specific job conditions.

7.14 Respiratory Protection Program (Safety Policy and Procedure)

7.14.1 The Corporate Respiratory Protection Program must be in writing and reviewed by the Corporate Safety Department periodically.

7.14.2 The Corporate Safety Department shall perform frequent random inspections of the jobsites to ensure that the provisions of the program are being implemented on affected team members.

7.14.3 The jobsite specific respiratory protection plan must be in writing and reviewed periodically. Supervisors and Safety Specialists and the Program Administrator must

consult team members wearing the respirators to assess wearer acceptance and attempt to correct any problems. Factors to consider are:

- Respirators being used are preventing the occurrence of illness.
- Respirators being used fit properly.
- Respirators being used were properly selected for the hazards encountered.
- Respirators are being worn when necessary.
- Respirators are being maintained properly.
- Any problems identified are corrected and documented in the job specific plan.

7.14.4 Program Elements

This written job specific program must cover the following elements:

- Identity of the Program Administrator.
- Procedures for selecting respirators for use in the workplace.
- Medical evaluations of team members required to wear respirators.
- Use of respirators.
- Fit testing procedures for air-purifying respirators and tight fitting positive pressure respirators.
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, or otherwise maintaining respirators.
- Procedures to ensure proper air quality, quantity and flow for atmosphere-supplying respirator.
- Training of team members in the respiratory and health hazards of the hazardous chemicals to which they are potentially exposed.
- Training of team members to ensure the proper use and maintenance of the respirators.
- Procedures for periodically evaluating the effectiveness of the program.

7.14.5 Administration

- This program shall be managed, administered and periodically reviewed by the Manager of Health and Environmental Hazards.

The written site-specific plan shall be managed by a program administrator identified at each site.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 Document available on Cianbro.net>Standard Operating Procedures – on the SOP

Qualitative Fit Test Report	SD997
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Job Specific Planning Checklist

1. What is/are the hazard(s) that require respiratory protection?
 - a. What are the contaminants?
 - b. What are their concentrations?
 - c. Are they gaseous or particulate?
 - d. Do they have adequate warning properties?
 - e. Is the atmosphere IDLH?
 - f. Does the air contain at least 19.5% oxygen?
 - g. Is other PPE necessary such as protective clothing or hand protection?

2. What engineering or administrative controls will reduce or eliminate the hazard?

3. What respirator type (and cartridge or filter if appropriate) is needed? - ½ face, full face, PAPR, escape, or supplied air with or without escape bottle respirators – organic vapor, acid gas, HEPA, combination, etc. cartridges.

4. Are all team members current for:

fit test to specific respirator		annually
respirator training		annually
medical questionnaire		annually
pulmonary function test (PFT)		every 3 years

5. What other hazards exist? –skin hazard, heat stress, eye hazard, etc.

6. Has a written site-specific respirator plan been developed? See Appendix E.

7. As part of the activity plan, have team members been trained in the respiratory hazards to which they could be exposed in routine or emergency situations?

This plan shall be updated as necessary to reflect any changes in job site conditions that affect respirator use. The program administrator and safety specialist shall evaluate the effectiveness of this plan by observation of respirator use and talking with respirator users.

FIT TEST PROTOCOLS

I Fit Testing Procedures-General

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape and if fitted and used properly will provide adequate protection.
4. The test subject shall be instructed to hold each chosen face piece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item (6). If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subjects adequate time to determine the comfort of the respirator
 - a. Position of the mask on the nose
 - b. Room for eye protection
 - c. Room to talk
 - d. Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit.
 - a. Chin properly placed
 - b. Adequate strap tension, not overly tightened
 - c. Fit across nose bridge
 - d. Respirator of proper size to span distance from nose to chin
 - e. Tendency of respirator to slip and
 - f. Self-observation in mirror to evaluate fit and respirator position.
8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in section VII. Paragraph B of this safety policy and procedure or those recommended by the respirator manufacturer, which provide equivalent protection. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another face piece shall be selected and re-tested if the test subject fails the user seal check tests.
9. The test shall not be conducted if there is any hair growth between the skin and the face piece-sealing surface, such as stubble beard growth, beard, mustache or sideburns, which cross the respirator-sealing surface. Any type of apparel, which interferes with a satisfactory fit, shall be altered or removed.
10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to Cianbro's medical director to determine whether the test subject can wear a respirator while performing her or his duties.
11. If the team member finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be re-tested.

12. Exercise regimen. Prior to the commencement to the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.
13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use, which could interfere with respirator fit.

II Quantitative Fit Test Procedure

1. The instrument used shall be a Dynatech Controlled Negative Pressure (CNP) Fit Test Machine.
2. The instrument shall have a non-adjustable test pressure of 15.0mm water pressure.
3. The CNP system defaults selected for test pressure shall be set at -1.5mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests. (Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)
4. The individual who administers the CNP fit testing shall be thoroughly trained to perform the test.
5. The person administering the test must be able to calibrate the equipment, perform the tests properly, recognize invalid tests, calculate fit factors properly if required and ensure the test equipment is in proper working order.
6. The CNP machine must be kept clean and maintained and calibrated according to the manufacturer's instructions so that it will operate at the parameters for which it was designed.
7. The respirator filter or cartridge needs to be replaced with the CNP test manifold (adapter). The inhalation valve downstream from the manifold needs to be temporarily removed.
8. The test subject shall be trained to hold his or her breath for at least 20 seconds.
9. The test subject shall don the test respirator without any assistance from the individual who administers the CNP fit test.
10. The person administering the test shall now test the team member after each of the following exercises:
 - A. Normal Breathing
In a normal standing position without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.
 - B. Deep Breathing
In a normal standing position the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during test.
 - C. Turning Head Side to Side
Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurements. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

- D. Moving Head Up and Down
Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurements.
 - E. Talking
The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.
 - F. Grimace
The test subject shall grimace by smiling or frowning for 15 seconds.
 - G. Bending Over
The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.
 - H. Normal Breathing
The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.
11. The test instrument shall have an effective audio warning device when the test subject fails to hold his or her breath during the test. The test shall be terminated whenever the test subject failed to hold his or her breath. The test subject may be refitted and re-tested.
 12. A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used: and date tested.

III. Qualitative Fit Test Procedure

Irritant Smoke (Stannic Chloride) Protocol

1. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 filters.
2. Only stannic chloride smoke tubes shall be used for this protocol.
3. Absolutely no form of test enclosure or hood for the test subject shall be used.
4. The smoke can be irritating to the eyes, lungs and nasal passages. The person doing the testing shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to cause a response from the test subject.
5. **The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.** If necessary, tester should also wear a respirator.
6. The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

7. The person administering the test shall break both ends of a ventilation smoke tube containing stannic chloride, attach one end of the smoke tube to a 50 ml aspirator squeeze bulb (four steady squeezes per minute will give the required 200 ml/min, if a different size bulb is used adjust the number of squeezes to give 200 ml/min). Cover the other end of the smoke tube with a short piece of tubing to prevent a potential injury from the jagged end of the tube.
8. Advise the test subject that the smoke can be irritating to the eyes, lungs and nasal passages and instruct the team member to keep his/her eyes closed during the test.
9. The team member shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to determine if he/she can detect the irritating properties of the smoke. The person doing the testing shall carefully direct a small amount of irritating smoke in the team member's direction to determine that he/she can detect it.
10. Once the sensitivity check is satisfactorily completed, the person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
11. The team member shall be instructed to keep his/her eyes closed.
12. The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the team member. The test operator shall begin at least 12 inches from the face piece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.
13. If the team member has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.
14. The following exercise shall be performed by the team member while the respirator seal is being continually challenged by the smoke directed around the perimeter of the respirator at a distance of six inches.
 - A. Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for one minute.
 - B. Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for one minute, taking caution so as not to hyperventilate.
 - C. Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side for one minute. The head shall be held at each extreme momentarily so the subject can inhale at each side.
 - D. Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down for one minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
 - E. Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor for one minute. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100 or recite a memorized poem or song.
 - F. Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes for one minute. Jogging in place shall be substituted for this exercise in those test areas or circumstances that do not allow bending over.
 - G. Normal breathing. Same as exercise (1).
15. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.
16. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being re-tested must repeat the entire sensitivity check and fit test procedure.
17. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
18. If a response is produced during this second sensitivity check, then the fit test is passed.

Rainbow Passage

When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

Cleaning and Disinfecting Protocol

Procedures for cleaning and disinfecting respirators:

1. Remove filters, cartridges, or canisters. Completely disassemble face pieces (remove speaking diaphragm, hoses, valve assemblies, o-rings, etc.). Discard or repair any defective parts.
2. Wash components in warm (110°F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to help remove the dirt.
3. Rinse the pieces thoroughly in clean, warm, preferably running water. Drain. Skip to step 6 if a cleaner containing a disinfectant was used.
4. If the cleaner used did not contain a disinfecting agent, you must immerse the respirator pieces for two minutes in the following solution:
 - A hypochlorite solution made by adding approximately 1 milliliter of laundry bleach to one liter of warm water. Alternatively you could use another respirator disinfectant product if used as directed and it is recommended by the respirator manufacturer.
5. Rinse the pieces thoroughly in clean, warm, preferably running water. Drain. It is extremely important that they are thoroughly rinsed because detergents or disinfectants that dry on the face piece can cause dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. The respirator pieces should be air dried or hand dried with a lint free cloth. Make sure the pieces are thoroughly dry. A hair dryer may be used if allowed by the manufacturer.
7. Reassemble the face piece and test the respirator to ensure that all components work properly. You do not have to put it on to check it; visually check for distortion in shape, missing or loose components, blockage, improper connections, pliability and deterioration of the flexible pieces, etc.

**Respirator Work Modifications
Exertion Levels for Activities Demanding Respiratory Protection**

The table below contains relative exertion levels for different activities common to the work we do as a company. It is not all inclusive but gives you a framework to decide where other activities fit. Cianbro's medical director approves team members to wear a respirator by type of respirator (CA – ½ face and full face negative pressure respirators, PA – PAPR's, or SA – supplied air respirators) and at what maximum exertion level the team member can wear the respirator.

Exertion level 2 is the least strenuous and exertion level 5 is the most strenuous. Remember that excessive heat due to environmental conditions or PPE must be taken into account. For example, heat stress could make a task that was an exertion level 2 into an exertion level 3 or higher. Take into account any other factors that could cause a task to be more strenuous as well.

Cianbro Exertion Level Table

Activities	Exertion Level
Oxy-fuel gas cutting	2
Painting with lead paint	2
Torch burning	2
Welding	2
Abrasive blasting in shop environment	3
Grinding	3
Manual sanding/scraping (mill/bridge rehab)	3
Power tool cleaning without dust collection	3
Abrasive blasting in bridge environment	4
Confined Space	4
Power tool cleaning with dust collection	4
Rivet busting	4
Confined space rescue	6
High heat stress (100° F and high humidity)	5

Table 1 -- Assigned Protection Factors⁵

Type of respirator ^{1, 2}	Half mask	Full face piece	Helmet/hood	Loose-fitting face piece
1. Air-Purifying Respirator	³ 10	50	.....	.....
2. Powered Air-Purifying Respirator (PAPR)	50	1,000	⁴ 25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator				
-Demand mode	10	50	.....	.....
-Continuous flow mode	50	1,000	⁴ 25/1,000	25
-Pressure-demand or other positive-pressure mode	50	1,000	.....	.....
4. Self-Contained Breathing Apparatus (SCBA)				
-Demand mode	10	50	50	.....
-Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	.....	10,000	10,000	.....

Notes from Table:

¹Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

²The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

³This APF category includes filtering face pieces, and half masks with elastomeric face pieces.

⁴The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting face piece respirators, and receive an APF of 25.

⁵These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d) (2) (ii).

Site Specific Respiratory Protection Plan

Site: _____

Date: _____

Program Administrator: _____

Responsibilities: All aspects of the site-specific plan including respirator selection, cartridge change out schedules, and evaluating the effectiveness of the plan.

Training: All team members required to use a respirator on this site will be trained in the requirements of this plan and the other items listed in section VIII of Cianbro's Respiratory Protection Program Safety policy and procedure. Attach the training roster.

Respirator Selection: All respirators and cartridges at this site will be selected by the Program Administrator, will be specific to each task, and will be included in the activity plan. All respirators will be provided to the team member at no charge.

Cleaning and Disinfecting:

Who is responsible? : _____
How often will they be cleaned? : _____
At what location will they be cleaned? : _____
What materials will be used to clean them? : _____

Post the cleaning procedure at the location used for cleaning. Refer to the Safety Policy and Procedure, Appendix C for guidance.

Respirator wipes will be used only during the shift to clean respirators before reuse after breaks or to wipe down PAPR battery packs and pumps or other equipment at the end of the shift.

Storage Requirements:

Respirators will be stored in these containers: _____
Respirators will be stored at this location: _____

Inspection: Respirators will be inspected before each shift by each team member, whenever they are cleaned, and at any other time there is reason to believe the respirator may have been damaged. Damaged respirators will be immediately removed from service and a replacement obtained from the Program Administrator.

Medical Approvals: All team members will have current (within the last 12 months) approval by Cianbro's Medical Director to wear a respirator. The Program Administrator will monitor this.

Fit Testing: The Program Administrator will ensure all team members have a current fit test (within the last 12 months) for the make, model, style, and size respirator they will use on this site.

Standard Operating Procedures: Attach to this plan. Include both emergency and non-emergency procedures for respirator use at this site. Include possible consequences of equipment failure, power failure, cartridge breakthrough, uncontrolled chemical release, fire, explosion, or human error as they apply to this site.

Cartridge Change Out Schedule(s) (attach data used to determine schedule) [REQUIRED]:

Policy Number 006

Authorized By: Michael W. Bennett

Title: Workplace Protection Program for Lead and Other Heavy Metals

Effective Date: 01/01/75

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1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 To recognize and manage health hazards associated with lead and other heavy metal exposure in the workplace. The precautions for lead will also protect against the other heavy metals that may be present. Air sampling will identify additional actions that may have to be taken.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Competent Person:** A person who has the knowledge to identify hazards associated with the work, has the knowledge to correct those hazards, **and has the authority to take the necessary corrective actions.**
- 4.2 **Competent Person on jobs that require SSPC QP-2:** The same as above and has taken the SSPC C-3 thirty-two hour Competent Person for Deleading of Industrial Structures training and is current with the required annual refresher training.
- 4.3 **QP1 and QP2:** These are painting contractor certification programs administered by The Society for Protective Coatings. QP1 evaluates contractors who perform surface preparation and industrial coating application on steel structures in the field in the areas of management procedures, quality control, safety and environmental compliance, and technical capabilities. QP2 is a supplement to QP 1 that evaluates the contractor's ability to perform industrial hazardous paint removal in a field operation. QP 2 Certification requires demonstrated competence in four key areas: Management of Hazardous Paint Removal Projects, Technical Capabilities Related to Hazardous Paint Removal, Personnel Qualifications and Training, and Safety and Environmental Compliance Programs. Holding these certifications allows us to do work for clients that require the certifications in their specifications.
- 4.4 **Society for Protective Coatings (SSPC):** SSPC is a non-profit association that is focused on the protection and preservation of concrete, steel and other industrial and marine structures and surfaces through the use of high-performance industrial coatings. It provides information on surface preparation, coating selection, coating application, environmental regulations, and health and safety issues that affect the protective coatings industry. It administers the contractor certification programs of QP1 and QP2.

5 Policy

- 5.1 Prior to any work, the presence of lead or other heavy metals will be identified and a job or task specific activity plan developed that meets the requirements contained within this policy.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site. S/He must also insure that this program and the project specific program are available for review at all times by any affected team member.
- 6.2 Corporate Safety is responsible for maintaining this document and for reviewing and updating it at least annually.
- 6.3 The Project Manager (top Cianbro manager on the job) is responsible for notifying The Society for Protective Coatings (SSPC) prior to the start of any job where the specifications require QP-2 certification.

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7.1 Cianbro may be exposing its team members to lead and other heavy metal hazards when work involves activities like cutting, burning, grinding, removal, scraping coated materials and housekeeping (sweeping). **BEFORE** any activity begins, projects must take measures to identify the presence of LEAD in the areas where our team members will work.

- **Any detectable amount of lead, cadmium, chromium, or arsenic requires meeting this policy and the appropriate OSHA standard.** Other heavy metals will be reviewed case by case based on levels and expected work methods but will require following section 7.3.2 of this document at a minimum. Contact the Corporate HSE Manager.
- Use existing test documentation from the owner to see if lead or other heavy metals are present on the painted surface or in the boiler ash.
- Lead Check swabs can be used to check for the presence of lead in coatings but are not very accurate. If a positive result is obtained, then lead is present. However, if a negative result is obtained, then a paint chip sample must be done to verify.
- Take a representative sample of the coated material and test for LEAD, PCB's, CHROMIUM, and CADMIUM. Contact the Safety Department with any questions about sampling. Send copies of the results to the Corporate HSE Manager for review.
- Take a representative sample of boiler ash and test for heavy metals (the 8 RCRA metals plus vanadium). Confirm with client fuel type used.
- Test soil and sediment samples around the work area as required or necessary to establish a base line to verify a known or suspected presence of lead and/or other contamination.
- Additional potential sources of lead exposure include lead in solders, pipes, batteries, circuit boards, cathode ray tubes, leaded glass, and construction/demolition debris.

7.2 Planning for Lead Exposure Protection

Managing a lead and other heavy metals hazard means the project must plan for the potential team member's health and environmental impacts before the work begins. Each lead and other heavy metal activity must be addressed in a job-specific activity plan with a primary focus on eliminating/minimizing the lead exposure. Each activity plan must address team member medical surveillance, personal protection, safe hygiene practices/controls, environmental controls, engineering controls, work practice controls, training, emergency procedures, waste disposal and the identification of a competent person. Please refer to the Heavy Metals Protection Program Planning Checklist SD1065 or to Appendix G (Boiler Work Guidelines) for guidance.

7.3 Other Heavy Metals Exposures

7.3.1 OSHA has specific health standards for hexavalent chromium, cadmium and arsenic. These standards include requirements for air monitoring, PPE, personal hygiene facilities, medical surveillance, emergency procedures, and other requirements. If chromium, cadmium or arsenic is found on your project (in paint, boiler ash or other), following the requirements of this Safety Policy and Procedure is expected to protect team members from chromium, cadmium and/or arsenic exposure. If arsenic, chromium, or cadmium is found to be present, air sampling will be done for these along with the lead. If exposures exceed the action level (2.5 ug/m³ for cadmium and chromium or 5 ug/m³ for arsenic), additional medical surveillance may be required. No team member shall be exposed in excess of the PEL or TLV (e.g. PEL of 5 micrograms per cubic meter of air as an 8-hour TWA for hexavalent chromium.) Contact the corporate HSE Manager. In addition, all potentially exposed team members shall be trained in the hazards of chromium, cadmium or arsenic.

7.3.2 Other heavy metals (silver, barium, vanadium, mercury, and selenium) do not have specific health standards but do have permissible exposure limits. If these metals are found to be present at your site, then HAZCOM training and air monitoring shall be done. See Appendix H (Table of Permissible Exposure Limits and Action Levels).

7.4 Competent Person

Each activity involving lead or other heavy metals requires a competent person to be onsite. A competent person by definition has the knowledge to identify hazards associated with the work, has the knowledge to correct those hazards, and has the authority to take the necessary corrective actions. If the person does not have the authority to make changes, then that person cannot be the competent person. The competent person must be identified on the specific activity plan. A back up shall be identified when the competent person is not present at the site. The duties include at a minimum ensuring appropriate training is provided, inspecting the work daily (see SD#1058), and reviewing the specific activity plans. In addition, for sites where The Society for Protective Coatings (SSPC) QP-2 certification is required in the job specifications, the competent person must have had SSPC C-3 thirty-two hour Competent Person for Deleading of Industrial Structures Training or equivalent and 8 hours of annual refresher training.

7.5 Establishing a Project Specific Written Lead/Heavy Metal Program

Establish and implement a job specific written protection program that incorporates this Safety Policy and Procedure. Complete the heavy metals plan section of the major activity plan to include:

7.5.1 A description of each activity in which exposure to lead/heavy metals is expected; e.g. equipment used, material involved, controls in place, crew size, team member job responsibilities, operating procedures, maintenance practices and a competent person.

7.5.2 A description of the specific means that will be employed to achieve compliance and, where engineering and work practice controls are required to reduce exposure levels below the PEL, document plans and studies used to determine methods selected for controlling exposure to lead.

- 7.5.3 A description of the technology considered in attempting to reduce the exposure levels below the PEL when feasible (ventilation, filtering, respirators, containment). Document the reasons why some controls available are not feasible or possible to do.
- 7.5.4 Monitoring data that documents the source of lead/heavy metals emissions.
- 7.5.5 A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.
- 7.5.6 Provide written notification to vendors and subcontractors (i.e., salvage dealers) when materials containing lead/heavy metals in paint coatings are sold/given to them.
- 7.5.7 A work practice program that includes protective work clothing and equipment, housekeeping and hygiene facilities/practices and incorporates other relevant team member work practices.
- 7.5.8 Provide, when feasible and allowed, administrative controls schedule for team members minimizing the time spent working in lead/heavy metals area.
- 7.5.9 Hazard and solution identification documented in the activity plan(s) and conveyed to all team members working in the lead/heavy metals control area(s).
- 7.5.10 Regular and frequent inspections by the competent person.
- 7.5.11 Method of informing other contractors and subcontractors of potential heavy metals exposure if applicable.
- 7.5.12 Procedures to minimize team member exposure to heavy metals (including cadmium) if maintenance of ventilation or exhaust systems is required including changing of filters.

7.6 Training

Prior to any activity having the potential for contamination and/or exposure to lead or other heavy metals, and annually thereafter, Cianbro team members must receive documented job-specific training in the following areas: (Normally, the Safety Specialist would conduct training). Training materials shall be readily available to all affected team members. *If other heavy metals are expected to be present, then they shall be included in the training listed below.*

- 7.6.1 Review activity plan in regards to lead exposure/handling and hazards/solutions.
- 7.6.2 Specific activities that could result in exposure to lead and lead exposure levels (if known) for the work activities.
- 7.6.3 Team members must avoid exposure to lead and heavy metals by following all signs, labels, and assessment reports identifying the presence of heavy metals. Ensure appropriate work practices are identified in the activity plan to prevent disturbing of lead and other heavy metal containing materials not required by the scope of work.
- 7.6.4 Health hazards associated with lead exposure (reference and use this Safety Policy and Procedure and Cianbro's Hazard Communication Program Safety Policy and Procedure).
- 7.6.5 Proper use, wear, care, and maintenance of protective clothing and equipment including respirators.
- 7.6.6 Engineering/administrative work practice controls needed to minimize hazards.
- 7.6.7 Purpose of medical surveillance and team member rights concerning this information. Include medical removal provisions and their rights.
- 7.6.8 Discuss requirements concerning warning signs for work areas.

- 7.6.9 Review content and appendices of OSHA Occupational Safety and Health Standards, (section 1926.62 lead, 1926.1118 for arsenic, 1926.1127 for cadmium, 1926.1126 for hexavalent chromium). (Use Appendix "E" for training team members in CFR 1926.62).
- 7.6.10 Proper handling of contaminated materials and waste.
- 7.6.11 No chelating agents to be used except under direction of a licensed physician.
- 7.6.12 Team member rights to access exposure and medical records (CFR 1910.1020).
 - Explain existence and location of records.
 - Person responsible to maintain and provide access to records.

7.7 Eliminating/Minimizing Exposure

- 7.7.1 The first step in lead or other heavy metal activity planning is determining whether the hazard can be eliminated or encapsulated. If feasible, can the coating be removed before working on the surface (blasting coating off-site, chemical stripping, etc.)?
- 7.7.2 If a hazard cannot be eliminated, the next step is to minimize it. This can be done through engineering, administrative and work practice controls such as work isolation, job rotation, mechanical ventilation, increased torch length, and alternative removal methods. If administrative controls are used, (i.e. job rotation), a log of the rotating team members (name, SS#, duration/exposure levels/activity, etc.) must be kept on site and with the activity plans.
- 7.7.3 REMEMBER, if the hazard cannot be eliminated and the levels exceed the PEL (50 ug/m3 for lead), the lead work area must be clearly marked and posted with signs. Use appropriate language for other metals if air monitoring shows levels at or above the PEL. Cianbro recommends posting signs for all lead work areas reading.

You also need signs for arsenic, hexavalent chromium or cadmium work areas if they are present above the PEL.

**WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING**

**DANGER
HEXAVALENT CHROMIUM
CANCER HAZARD
AUTHORIZED PERSONNEL
ONLY
NO SMOKING OR EATING**

**DANGER
INORGANIC ARSENIC
CANCER HAZARD
AUTHORIZED PERSONNEL
ONLY
NO SMOKING OR EATING
RESPIRATOR REQUIRED**

**DANGER
CADMIUM
CANCER HAZARD
AVOID CREATING DUST
CAN CAUSE LUNG AND KIDNEY
DISEASE**

7.8 Exposure Assessment and Air Monitoring

- 7.8.1 Supervisors working with lead or other heavy metal containing coatings must plan and develop safeguards to protect against exposures resulting from outside elements (wind, temperature) and work location (indoors, outdoors, over water, over workers, near public areas, etc.). Containment plans, should they be needed, must be project-specific and meet the needs of the people in the work area. The Safety Department is available to help projects develop containment plans if deemed necessary by the competent person.

- 7.8.2 Each work activity (burning, welding, rivet busting, scraping, etc.) must be monitored to determine the levels of team member lead/heavy metals dust/fume exposure and the effectiveness of engineering controls, work practice controls, PPE, etc. Air monitoring must be done during a team member's regular daily duties. Initial air sampling should be taken as soon as possible with the start of an activity (within 24 hours, if possible) and the results received from the lab as soon as possible (within 48 hours, if possible). Respiratory protection must be determined by the airborne lead level results and the specific work activity. (Refer to Appendix A for respiratory selection). Compare results to the PEL. (Remember to adjust action limit and PEL if working other than 8-hr shifts.)
- 7.8.3 Continue air monitoring until two consecutive tests are obtained below the action level. A historical sampling result may be used as one of the two tests at least 7 days apart if the following conditions are met: acceptable historical air monitoring results are current within the last 12 months and taken where workplace conditions closely resemble the current work (essentially the same types of materials, tools, engineering and work practices, and environmental conditions). Also see Appendix C.
- 7.8.4 In performing air monitoring (personal air sampling), documentation needs to be specific/detailed as to actual work activity tasks, time exposed to lead or non-lead work for the full shift, etc.
- 7.8.5 Any changes in the work activities or conditions that could possibly result in increased exposure require immediate further air monitoring.
- 7.8.6 Air monitoring needs to be done to represent each group of people who have similar exposures (for each task, location, work method, etc.).
- 7.8.7 Environmental Air Monitoring
- Perform Total Suspended Particulate (TSP) monitoring when appropriate. (Usually on large outside jobs or jobs that vent outside.) Contact the Corporate Safety Department to coordinate any TSP monitoring that is required. Follow the environmental guidebook to establish and set up TSP monitoring.
 - Perform air monitoring prior to any lead abatement work.
 - Perform air monitoring during lead abatement activity.
 - Use trained individuals to perform this monitoring.
 - Document the sampling.

NOTE: Proper positioning of these instruments is important (Refer to Cianbro's Environmental Guidebook). TSP monitoring data will help document that Cianbro is not polluting the environment or violating the state and/or federal Clean Air Act requirements.

The allowable limit is 0.15 ug/m³ as a 90-day average. To adjust this limit to a daily average, use the following formula:

$$DA = (90 \div PD) \cdot 0.15 \text{ ug/m}^3$$

DA=Daily Allowance for 24 hour period

PD=Number of days lead work will be performed in 90 day period

THEN

$$ADA = DA(24 \div H)$$

ADA=Adjusted Daily Allowance (ug/m³)

DA=Daily Allowance (ug/m³)

H=Hours worked in 24 hours

7.9 Personal Protective Equipment

After engineering and work practice controls are in place to minimize the lead or other heavy metal contamination hazard, protective clothing must be utilized. At a minimum, this shall include gloves, coveralls or Tyvek suits, boots, eye protection and hard hats. These items will be provided at no cost to team members. Clean protective coveralls or Tyvek suits must be provided daily, if the airborne lead level is above 200 ug/m³ and weekly if the airborne lead level is below 200ug/m³. However, Tyvek suits must be repaired or replaced immediately if ripped or torn. Respiratory protection should only be used as a last resort or under the following circumstances;

- When there is no reasonable way to eliminate the airborne contaminant.
- During periods necessary to implement feasible engineering and work practice controls.
- If initial air monitoring results show that the contaminant still exists at levels above the PEL despite our engineering and work practice controls.
- During emergency situations.

When necessary, respiratory protection will be determined/selected in accordance with Appendix A and used in accordance with 29 CFR 1910.134. PAPR's must be made available to team members should they request them provided known exposure limits for PAPR use are not exceeded.

7.10 Hygiene Practices and Controls

Lead and other heavy metal exposure occurs through ingestion and inhalation (and also skin contact for hexavalent chromium). This usually results from ingesting lead or other heavy metal particles that come in contact with food, coffee, and cigarettes, or through inhaling paint dust/fumes (without the benefit of a respirator). Good hygiene practices are extremely important no matter which type of lead activity is performed. Adequate time must be allowed for good hygiene practices so as not to interfere with team member break, lunch and shift completion times. To avoid any team member or environmental contamination, the following hygiene practices will be used on all projects with lead or other heavy metal activity:

- 7.10.1 Running water (heated if possible), soap (pumpable preferred since it prevents contamination of soap), clean towels, and readily available trash container to ensure team members wash their hands and face prior to eating, drinking, smoking, and leaving the project. Showers are also required, where feasible, when team members are subject to the possibility of skin or eye irritation from inorganic arsenic or when airborne exposure to lead and/or cadmium is above the respective PEL as determined by the length of the work shift.
- 7.10.2 Any contact to potentially lead or other heavy metal contaminated materials requires hand and face wash as soon as possible to prevent ingestion.
- 7.10.3 Clean change room/area for removing necessary street clothes and putting on protective clothing. Instructional signs should be posted in change and wash areas to ensure proper steps are taken to prevent exposures. Separate change room/area, including closed disposal container, for team members to remove contaminated clothing. Contamination must not spread to street clothes, team member homes and children.
- 7.10.4 Establish check point(s) at access/egress point(s) to lead work area(s). Assign an individual at this check point(s) to monitor team member hygiene practices exiting work area(s).
- 7.10.5 All dirty coveralls must be placed into a separate container. This container must be marked:

CAUTION: "Clothing contaminated with lead (or hexavalent chromium if appropriate). Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with local, state and federal regulations."

- 7.10.6 Laundry cleaning service must be notified in writing that clothing is contaminated with lead or hexavalent chromium.
- 7.10.7 Provide clean lunch/break room, separate from change area. Team members must HEPA vacuum themselves off at a checkpoint when leaving the regulated work area or remove contaminated clothing and in either case, wash hands and face before entering a clean area.
- 7.10.8 A written housekeeping and maintenance plan must be developed to insure that surfaces, work areas, and equipment are maintained and kept free of an accumulation of contamination. Whenever possible, cleaning should be done with a vacuum equipped with High Efficiency Particulate Air (HEPA) filter. The clean areas (change room/area, lunch room/area, etc.) must have less than 200 ug/ft² of lead contamination (wipe test) (There is not yet a clean level for hexavalent chromium, just requirement to keep it clean). Wipe samples should be done approximately every two weeks, more often if there is reason to believe the areas are not staying clean.
- 7.10.9 Equipment being removed from a lead controlled area needs to be decontaminated by vacuum or water wash. (i.e. body harness/lanyards, grinders, cords, hoses, small tools, etc.).

CAUTION: Cleaning and maintenance methods must be utilized that minimize team member exposure. Do not use methods that introduce contaminated dust into the air (like dry sweeping, blow down, etc.).

NOTE: There will be no smoking, eating, or drinking in regulated work/change areas that contain heavy metals, only in properly designated areas. There will also be no smoking, eating, and drinking until contaminated outer clothing is removed or HEPA vacuumed and team members have washed up. Furthermore, smoking and eating/drinking materials are not allowed in the lead area. Failure to follow these guidelines has been the leading cause of high blood-lead levels!

7.11 Team Member Lead Medical Surveillance

For cadmium, hexavalent chromium or arsenic medical surveillance requirements, contact the corporate health and environmental manager. It will be based on air sampling results and length of work.

- 7.11.1 Team members who will be participating in activities constituting a potential exposure to lead will undergo blood lead/ZPP testing as follows:
- Blood lead/ZPP testing will be performed initially (one time) for new team members. Team members new to the lead medical surveillance program who are expected to be exposed to lead above the action level more than 30 days in a 12 month period will additionally be blood lead tested every two months for the first 6 months.
 - Team members will be retested annually when expected to be exposed to low exposure lead activities (<30 ug/m³).
 - If team members currently monitored under this medical surveillance program are exposed to documented high risk/high exposure activities (>30 ug/m³), the frequency of blood lead testing will increase to every 6 months for the period of exposure. Team member must be current with his/her blood lead test within 6 months or a new blood lead test must be offered to the team member.
 - Cianbro requires increased frequency of biological monitoring if the PEL (50 ug/m³) is met or exceeded. Should exposure monitoring equal or exceed the PEL, contact Corporate Safety immediately for assistance in engineering/workplace controls to reduce the hazard and to establish frequency of blood lead/ZPP testing requirements.

7.11.2 Blood Lead/ZPP Testing

- A. Review Cianbro's Blood Lead Historical Report and ensure that team members expected to work in the lead area are current within one year, have a blood lead <40 ug/dl or are current within six months for high risk/high exposure activities with expected or known air monitoring results >30 ug/m³ for the new lead work activities.
- B. If team members are not current with blood lead/ZPP testing then schedule them for testing and notify Occupational Medical Consulting by faxing (207-524-2412) the Notice of Appointment Form immediately after making appointments with the clinic.
- C. Notify Occupational Medical Consulting (207-524-2410 or 1-800-575-6537) if you are having problems getting the clinic to draw blood after clinic hours or on weekends.
- D. Blood lead levels at or above 25 ug/dl (Cianbro's administrative limit)
 - If blood lead level is at or above 25 ug/dl, a First Report of Incident must be completed and the cause investigated by the competent person and project management.
- E. Blood lead levels at or above 40 ug/dl but below 50 ug/dl
 - If a blood lead level is at 40 ug/dl but below 50 ug/dl, blood lead testing must be done every month until two consecutive blood lead tests indicate levels below 40 ug/dl.
 - Removal from the lead environment until levels drop below 40 ug/dl and notify your regional safety superintendent/human resources manager.
 - Team members with blood lead level at or above 40 ug/dl but below 50 ug/dl must be offered a complete medical exam. If the team member declines, then the Medical Exam Decline Form SD1019, available on Cianbro.net must be completed by each team member declining such an exam.
 - Complete First Report of Incident and coach individual on personal hygiene and check respirator fit. Consider using a higher level of respiratory protection.
- F. Blood Levels at or Above 50 ug/dl
 - If a blood lead level is at or above 50 ug/dl, another blood lead test must be done within 2 weeks of receiving the results from the first blood lead sampling with levels over 50 ug/dl and then monthly until two consecutive samples indicate levels below 40 ug/dl.
 - Removal from the lead environment until levels drop below 40 ug/dl and notify your regional safety superintendent/human resources manager.
 - A blood lead level at or above 50 ug/dl is an OSHA Recordable Illness.
 - Complete a First Report of Incident Form and coach individual on personal hygiene and check respirator fit. Consider using a higher level of respiratory protection when go back into the lead work area.
 - Record incident on the OSHA 300 log.
 - Team member will be required to have a complete medical exam. At this point the exam is mandatory (Can't go back to a lead environment without it).

7.12 Medical Exams

The initial medical exam, when required, is done by a physician chosen by the employer. A second opinion, (see below), may be requested by the team member using a physician chosen by the team member. Notify Occupational Medical Consulting (OMC) immediately after exam appointment is scheduled.

Team members may request a medical exam if any one of the following holds true:

- 7.12.1 Team member has developed signs or symptoms commonly associated with lead intoxication.

- 7.12.2 Team member desires medical advice concerning the effects of current or past exposure to lead on his/her ability to have a healthy child. (Includes effects on pregnancy and male fertility.)
- 7.12.3 Team member has a blood lead level at or above 40 ug/dl at any time during the preceding 12 months.
- 7.12.4 Team member is pregnant and is or has worked in a lead environment within the last 12 months.
- 7.12.5 Team member has difficulty breathing with a respirator.
- 7.12.6 Team member is requesting a second opinion. See requirement 7.13.3 below.

7.13 Content of Medical Exam (see Appendix F)

- 7.13.1 Give two copies of this appendix to the team member before they go for their medical exam.
- 7.13.2 Instruct them to give a copy to the examining physician.
- 7.13.3 A team member has the right to request a second opinion after each occasion that an initial complete medical exam was given if the following is done by the team member:
 - The team member notifies Cianbro of the desire for a second opinion within 15 days after receipt of the results of the initial medical exam.
 - The team member initiates steps to make an appointment with a second physician.

7.14 Chelating Agents

- 7.14.1 Prophylactic chelation (used to keep blood lead levels from getting higher) even if physician prescribed is not allowed at any time.
- 7.14.2 Therapeutic or diagnostic chelation may be prescribed by a licensed physician and performed under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring. Team members will be notified in writing prior to any chelation therapy.
- 7.14.3 This type of therapy is only prescribed when severely high levels of lead are in the body. This treatment is similar to chemotherapy for the treatment of cancer. It can be painful depending upon the individual's tolerance to pain.

7.15 Recordkeeping

Cianbro shall maintain accurate records of all monitoring and other data used in conducting team member exposure assessments. Copies of all these records must be sent to the Corporate Safety Department. These records must be maintained for 30 years past the date of termination of the team member.

7.15.1 Exposure Monitoring Records

- The date(s), numbers, duration, location and results of each of the samples including a description of the sampling procedure used to determine representative team member exposure.
- A description of the sampling and analytical methods used and evidence of their accuracy.
- The type of respiratory protective devices worn.
- The name, social security number, and job classification of the team member(s) monitored.
- The environmental variables that could affect the measurement of team member exposure.

7.15.2 Medical Surveillance Records

- The name, social security number, and description of the duties of the team member.
- A copy of the physician's written opinion.
- Results of any airborne exposure monitoring done on or for that team member and provided to the physician.
- Any team member medical complaints related to exposure to lead.

7.15.3 Medical Removal Records

- The name and social security number of the team member.
- The date of each occasion that the team member was removed from current exposure to lead as well as the corresponding date on which the team member was returned to his or her former job status.
- A statement with respect to each removal indicating whether or not the reason for the removal was an elevated blood lead level.

7.15.4 Availability of Records

- A. Cianbro Corporation and Occupational Medical Consulting will make available upon written request from the affected team member(s), former team member(s), their designated representatives and the Assistant Secretary and Director all records listed above for examination and copying.
- B. The following medical records shall be kept by Cianbro Corporation's Medical Director at Occupational Medical Consulting:
 - A copy of the medical examination results including medical and work history.
 - A copy of the letter sent to the team member's home with the results of the biological monitoring

7.15.5 Training Records

Copies of all training rosters must be documented on a training attendance form (PD621) and sent to the Cianbro Institute at TrainingAttendance@cianbro.com.

7.15.6 Activity Plans

Complete Cianbro Corporation's specific Lead Activity Plan prior to performing any lead activity. This shall be done for any job involving lead work. *Any other heavy metal requires a site/task specific activity plan as well.* Can be combined in the same plan.

7.16 Waste Disposal

7.16.1 Treat all heavy metal contaminated waste as "hazardous waste". Dispose of it through one of Cianbro's approved hazardous waste disposal companies - Clean Harbors or Univar.

7.16.2 Store all heavy metal contaminated waste in UN or DOT approved containers (15, 30, or 55 gal.). Proper storage and handling, daily inspections, and shipping guidelines are listed in Cianbro's Hazardous Materials and Waste Management Handbook (The Cookbook).

7.16.3 Clearly identify the **generator (should be the Client)** of the contaminated waste shipments in the project contract. Ensure that Cianbro Corporation's name is not on any Hazardous Waste Manifest or other disposal documentation, **AND** ensure that a client representative, not a Cianbro team member, signs all disposal documentation/manifests.

7.16.4 Give all original paperwork to the Client representative and only keep photocopies at the jobsite. Send copies of paperwork to the Corporate Safety Department. Remember, if the client is the generator; **DO NOT** keep any original paperwork!

7.16.5 Any scrap steel painted with known lead base paint that is disposed of through a scrap metal dealer requires a letter be generated by project management, to the dealer. The letter must state that the steel is painted with lead based paint and could cause a health hazard to anyone working with the steel, such as burning or cutting directly on painted surfaces. The scrap dealer must be either shredding or melting down the steel. Otherwise, this is considered a hazardous waste.

7.17 Multi-employer Worksites

7.17.1 Subcontractors are required to follow the requirements of this policy and to notify Cianbro of any potential lead or other heavy metal exposure caused by their activities.

7.17.2 All potential exposure to lead and other heavy metals from work performed by our subcontractors, other contractors on site, or the client must be identified during the planning process. Team members who recognize potential exposures are required to leave the area and notify their supervisor. Work will continue once the hazard has been evaluated and proper controls implemented.

7.18 Safety at Home

Lead can be a serious risk for families and team members at home just as it can be on jobsites. It is critical not to bring contamination home with you. Follow the decon procedures thoroughly on your job site if lead is present. In addition, people at home can breathe in lead dust, put their hands or other objects covered with lead dust in their mouths, or eat paint chips or soil that contains lead. Remember lead is significantly more dangerous to children than it is to adults and at much lower levels. In most cases, intact lead paint is not a hazard. However, if you have to remove lead paint make sure to use a professional that understands the hazards. For more information, review the Environmental Protection Agency's pamphlet at <http://www.epa.gov/lead/pubs/leadpdf.pdf>.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

9.1 List of Related Documents Attached:

- 9.1 Appendix A Respiratory Selection Guide Chart
- 9.2 Appendix B Medical Surveillance – Required Actions Based on Blood Lead Level Results
- 9.3 Appendix C Required Actions Based on Airborne Lead Monitoring Results
- 9.4 Appendix D Summary of Lead Standard for Workers
- 9.5 Appendix E Health Effects and MSDS for Lead, Cadmium, Inorganic Arsenic, and Hexavalent Chromium
- 9.6 Appendix F Content of Lead Medical Exam
- 9.7 Appendix G Guidelines for Doing Boiler Work
- 9.8 Appendix H Table of Permissible Exposure Limits and Action Levels

9.2 Documents available on Cianbro.net

Heavy Metals Protection Program Planning Checklist	SD1065
Lead and Other Heavy Metals Work Inspection Checklist for the Competent Person	SD1058
Lead Medical Exam Decline Form	SD1019

9.3 Please Note: Training manual for presenter and student is available on Cianbro.net>Standard Operating Procedures - on the SOP 2.0 February_Lead & 2.1 February_Lead.

RESPIRATORY SELECTION GUIDE CHART FOR LEAD

1. Typical lead activities listed below require appropriate respiratory protection be used during the airborne lead monitoring assessment period.
2. Airborne lead monitoring results could change respirator type required to complete lead work activity.
3. Air monitoring conducted which reflect lower results than what is required for respiratory protection listed below may allow a lower protective respirator type.

RESPIRATORY SELECTION GUIDE		
PROPER RESPIRATORY PROTECTION WITH LEAD FUME/DUST ACTIVITY		
RESPIRATOR	PROTECTION FACTORS	TYPICAL LEAD ACTIVITIES
HALF/FULL FACE, PAPR, SUPPLIED AIR, SCBA (HIGH EFFICIENCY FILTERS)	UP TO 500 UG/M3 ALLOWABLE LIMIT (10XPEL)	-SPRAY PAINTING WITH LEAD PAINT -MANUAL DEMOLITION (DRY WALL) -MANUAL SANDING AND SCRAPING -POWER TOOL CLEANING WITH DUST COLLECTION SYSTEM -HEAT GUN APPLICATION
*FULL FACE, PAPR SUPPLIED AIR, SCBA *Full face allowed only if quantitatively fit tested. (HIGH EFFICIENCY FILTERS)	BETWEEN 500 TO 2500 UG/M3 ALLOWABLE LIMIT (50XPEL)	-RIVET BUSTING -LEAD BURNING, USING LEAD CONTAINING MORTAR -POWER TOOL CLEANING WITHOUT DUST COLLECTION SYSTEM -CLEANUP OF DRY EXPANDABLE ABRASIVES -MOVEMENT/REMOVAL OF BLASTING ENCLOSURES
SUPPLIED AIR, SCBA	OVER 2500 UG/M3 ALLOWABLE LIMIT (>50XPEL)	-ABRASIVE BLASTING -WELDING -TORCH BURNING -OXY-FUEL GAS CUTTING
SUPPLIED AIR, SCBA	OVER 2500 UG/M3 ALLOWABLE LIMIT (>50XPEL)	-ALL OTHER NON-TYPICAL LEAD ACTIVITIES INVOLVING AIRBORNE EXPOSURE

MEDICAL SURVEILLANCE

Blood Lead Exposure Levels

Blood Lead Results

- | | |
|---------------------|---|
| <25 ug/dl | <ul style="list-style-type: none">• OMC to send written notification of results within 5 days to team member's home.• Project provides verbal results to team members on site. |
| >25 ug/dl <40 ug/dl | <ul style="list-style-type: none">• OMC to send written notification of results within 5 days to team member's home. Project provides verbal results to team member.• Cianbro action level, project to counsel with team member looking into practices of hygiene and personal protection.• Complete first report of incident. |
| >40 ug/dl <50 ug/dl | <ul style="list-style-type: none">• OMC to send written notification of results within 5 days to team member's home. Project provides verbal results to team member• Remove from lead work areas.• Conduct more frequent blood lead testing (monthly) until 2 test results show levels <40 ug/dl before returning team member to lead work areas.• Evaluate/counsel with team member to determine source of higher than normal lead results. Coach on personal hygiene, check respirator fit, and consider higher level of respiratory protection.• Complete first report of injury.• Offer team member medical exam and/or consultation. Have medical exam decline form signed if team member declines. |
| >50 ug/dl | <ul style="list-style-type: none">• OMC to send written notification of results within 5 days to team member's home. Project provides verbal results to team member.• Remove from lead work areas.• Conduct more frequent blood lead testing (at least monthly) until 2 test results show levels <40 ug/dl before returning team member to lead work areas. Initial follow up must be within 2 weeks of receiving the results from the first blood sampling with level over 50 ug/dl.• Evaluate/counsel with team member to determine source of higher than normal lead results. Coach on personal hygiene, check respirator fit, and consider higher level of respiratory protection.• Complete first report of injury.• Record on OSHA 200 log as a job recordable illness.• Final medical determination (written medical opinion) on team member's health status required by Cianbro. |

NOTE: Removal from lead work areas may also be a physician order regardless of the blood lead level if the physician is concerned that either the patient has/or may develop a lead related illness or that aggravation of a pre-existing condition may/has occurred.

OSHA Federal Regulations
Appendix B to Sec. 1926.62 - Team Member Standard Summary

(EDITOR'S NOTE: The information contained in the appendices to this section is not intended by itself, to create any additional obligations not otherwise imposed by this standard nor detract from existing obligation.)

This appendix summarizes key provisions of the interim final standard for lead in construction that you as a worker should become familiar with.

I. Permissible Exposure Limit (PEL) - Paragraph (C)

The standard sets a permissible exposure limit (PEL) of 50 micrograms of lead per cubic meter of air (50 ug/m³), averaged over an 8-hour workday which is referred to as a time-weighted average (TWA). This is the highest level of lead in air to which you may be permissibly exposed over an 8-hour workday. However, since this is an 8-hour average, short exposures above PEL are permitted so long as for each 8-hour day your average exposure does not exceed this level. This interim final standard, however, takes into account the fact that your daily exposure to lead can extend beyond a typical 8-hour workday as the result of overtime or other alterations in your work schedule. To deal with this situation, the standard contains a formula that reduces your permissible exposure when you are exposed more than 8 hours. For example, if you are exposed to lead for 10 hours a day, the maximum permitted average exposure would be 40 ug/m³.

II. Exposure Assessment - Paragraph (D)

If lead is present in your workplace in any quantity, your employer is required to make an initial determination of whether any team member's exposure to lead exceeds the action level (30 ug/m³ averaged over an 8-hour day). Team member exposure is that exposure which would occur if the team member were not using a respirator. This initial determination requires your employer to monitor workers' exposures unless he or she has objective data that can demonstrate conclusively that no team member will be exposed to lead in excess of the action level. Where objective data is used in lieu of actual monitoring the employer must establish and maintain an accurate record, documenting its relevancy in assessing exposure levels for current job conditions. If such objective data is available, the employer need proceed no further on team member exposure assessment until such time that conditions have changed and the determination is no longer valid.

Objective data may be compiled from various sources, e.g., insurance companies and trade associations and information from suppliers or exposure data collected from similar operations. Objective data may also comprise previously collected sampling data including area monitoring. If it cannot be determined through using objective data that worker exposure is less than the action level, your employer must conduct monitoring or must rely on relevant previous personal sampling, if available. Where monitoring is required for the initial determination, it may be limited to a representative number of team members who are reasonably expected to have the highest exposure levels. If your employer has conducted appropriate air sampling for lead in the past 12 months, he or she may use these results, provided they are applicable to the same team member tasks and exposure conditions and meet the requirements for accuracy as specified in the standard. As with objective data, if such results are relied upon for the initial determination, your employer must establish and maintain a record as to the relevancy of such data to current job conditions.

If there have been any team member complaints of symptoms which may be attributed to exposure to lead or if there is any other information or observations which would indicate team member exposure to lead, this must also be considered as part of the initial determination.

If this initial determination shows that a reasonable possibility exists that any team member may be exposed, without regard to respirators, over the action level, your employer must set up an air-monitoring program to determine the exposure level representative of each team member exposed to lead at your workplace. In carrying out this air-monitoring program, your employer is not required to monitor the exposure of every team member, but he or she must monitor a representative number of team members and job types. Enough sampling must be done to enable each team member's exposure level to reasonably represent full shift exposure. In addition, these air samples must be taken under conditions

that represent each team member's regular, daily exposure to lead. Sampling performed in the past 12 months may be used to determine exposures above the action level if such sampling was conducted during work activities essentially similar to present work conditions.

The standard lists certain tasks which may likely result in exposures to lead in excess of the PEL and, in some cases, exposures in excess of 50 times the PEL. If you are performing any of these tasks, your employer must provide you with appropriate respiratory protection, protective clothing and equipment, change areas, hand washing facilities, biological monitoring, and training until such time that an exposure assessment is conducted which demonstrates that your exposure level is below the PEL.

If you are exposed to lead and air sampling is performed, your employer is required to notify you in writing within 5 working days of the air monitoring results that represent your exposure. If the results indicate that your exposure exceeds the PEL, (without regard to your use of a respirator), then your employer must also notify you of this in writing, and provide you with a description of the corrective action that has been taken or will be taken to reduce your exposure.

Your exposure must be rechecked by monitoring, at least every six months, if your exposure is at or over the action level but below the PEL. Your employer may discontinue monitoring for you if 2 consecutive measurements, taken at least 7 days apart, are at or below the action level. Air monitoring must be repeated every 3 months if you are exposed over the PEL. Your employer must continue monitoring for you at this frequency until 2 consecutive measurements, taken at least 7 days apart, are below the PEL but above the action level, at which time your employer must repeat monitoring of your exposure every six months and may discontinue monitoring only after your exposure drop to or below the action level. However, whenever there is a change of equipment, process, control, or personnel or a new type of job is added at your workplace that may result in new or additional exposure to lead, your employer must perform additional monitoring.

III. Methods of Compliance - Paragraph (E)

Your employer is required to assure that no team member is exposed to lead in excess of the PEL as an 8-hour TWA. The interim final standard for lead in construction requires employers to institute engineering and work practice controls including administrative controls to the extent feasible to reduce team member exposure to lead. Where such controls are feasible but not adequate to reduce exposures below the PEL they must be used nonetheless to reduce exposures to the lowest level that can be accomplished by these means and then supplemented with the appropriate respiratory protection.

Your employer is required to develop and implement a written compliance program prior to the commencement of any job where team member exposures may reach the PEL as an 8-hour TWA. The interim final standard identifies the various elements that must be included in the plan. For example, employers are required to include a description of operations in which lead is emitted, detailing other relevant information about the operation such as the type of equipment used, the type of material involved, team member job responsibilities, operating procedures and maintenance practices. In addition, your employer's compliance plan must specify the means that will be used to achieve compliance and, where engineering controls are required, include any engineering plans or studies that have been used to select the control methods. If administrative controls involving job rotation are used to reduce team member exposure to lead, the job rotation schedule must be included in the compliance plan. The plan must also detail the type of protective clothing and equipment, including respirators, housekeeping and hygiene practices that will be used to protect you from the adverse effects of exposure to lead.

The written compliance program must be made available, upon request, to affected team members and their designated representatives, the Assistant Secretary and the Director.

Finally, the plan must be reviewed and updated at least every 6 months to assure it reflects the current status in exposure control.

IV. Respiratory Protection - Paragraph (F)

Your employer is required to provide and assure your use of respirators when your exposure to lead is not controlled below the PEL by other means. The employer must pay the cost of the respirator. Whenever you request one, your employer is also required to provide you a respirator even if your air exposure level is not above the PEL. You might desire a respirator when, for example, you have received

medical advice that your lead absorption should be decreased. Or, you may intend to have children in the near future, and want to reduce the level of lead in your body to minimize adverse reproductive effects. While respirators are the least satisfactory means of controlling your exposure, they are capable of providing significant protection if properly chosen, fitted, worn, cleaned, maintained, and replaced when they stop providing adequate protection.

Your employer is required to select respirators from the types listed in Table I of the Respiratory Protection section of the standard (1926.62(f)). Any respirator chosen must be approved by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 42 CFR part 84. This respirator selection table will enable your employer to choose a type of respirator that will give you a proper amount of protection based on your airborne lead exposure. Your employer may select a type of respirator that provides greater protection than that required by the standard; that is, one recommended for a higher concentration of lead than is present in your workplace. For example, a powered air-purifying respirator (PAPR) is much more protective than a typical negative pressure respirator, and may also be more comfortable to wear. A PAPR has a filter, cartridge, or canister to clean the air, and a power source that continuously blows filtered air into your breathing zone. Your employer might make a PAPR available to you to ease the burden of having to wear a respirator for long periods of time. The standard provides that you can obtain a PAPR upon request.

Your employer must also start a Respiratory Protection Program. This program must include written procedures for the proper selection, use, cleaning, storage, and maintenance of respirators.

Your employer must ensure that your respirator facepiece fits properly. Proper fit of a respirator facepiece is critical to your protection from airborne lead. Obtaining a proper fit on each team member may require your employer to make available several different types of respirator masks. To ensure that your respirator fits properly and that facepiece leakage is minimal, your employer must give you either a qualitative or quantitative fit test as specified in Appendix A of the Respiratory Protection standard located at 29 CFR 1910.134.

You must also receive from your employer proper training in the use of respirators. Your employer is required to teach you how to wear a respirator, to know why it is needed, and to understand its limitations.

Your employer must test the effectiveness of your negative pressure respirator initially and at least annually thereafter with a "qualitative fit test". In this test, the fit of the facepiece is checked by seeing if you can smell a substance placed outside the respirator. If you can, there is appreciable leakage where the facepiece meets your face.

The standard provides that if your respirator uses filter elements, you must be given an opportunity to change the filter elements whenever an increase in breathing resistance is detected. You also must be permitted to periodically leave your work area to wash your face and respirator facepiece whenever necessary to prevent skin irritation. If you ever have difficulty in breathing during a fit test or while using a respirator, your employer must make a medical examination available to you to determine whether you can safely wear a respirator. The result of this examination may be to give you a positive pressure respirator (which reduces breathing resistance) or to provide alternate means of protection.

V. Protective Work Clothing and Equipment - Paragraph (G)

If you are exposed to lead above the PEL as an 8-hour TWA, without regard to your use of a respirator, or if you are exposed to lead compounds such as lead arsenate or lead azide which can cause skin and eye irritation, your team member must provide you with protective work clothing and equipment appropriate for the hazard. If work clothing is provided, it must be provided in a clean and dry condition at least weekly, and daily if your airborne exposure to lead is greater than 200 ug/m³. Appropriate protective work clothing and equipment can include coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe coverlets, and face shields or vented goggles. Your employer is responsible for providing repairs and replacement as necessary, and also is responsible for cleaning, laundering or disposal of protective clothing and equipment.

The interim final standard requires that your employer assures that you follow good work practices when you are working in areas where your exposure to lead may exceed the PEL. With respect to protective clothing and equipment, where appropriate, the following procedures should be observed prior to beginning work:

1. Change into work clothing and shoe covers in a clean section of the designated changing areas

2. Use work garments and appropriate protective gear, including respirators before entering the work area
3. Store any clothing not worn under protective clothing in the designated changing area.

Workers should follow these procedures upon leaving the work area:

1. HEPA vacuum heavily contaminated protective work clothing while it is still being worn. At no time may lead be removed from protective clothing by any means which may result in uncontrolled dispersal of lead into the air.
2. Remove shoe covers and leave them in the work area
3. Remove protective clothing and gear in the dirty area of the designated changing area. Remove protective coveralls by carefully rolling down the garment to reduce exposure to dust.
4. Remove respirators last.
5. Wash hands and face.

Workers should follow these procedures upon finishing work for the day (in addition to procedures described above):

1. Where applicable, place disposal coveralls and shoe covers with the abatement waste.
2. Contaminated clothing that is to be cleaned, laundered or disposed of must be placed in closed containers in the change room.
3. Clean protective gear, including respirators, according to standard procedures.
4. Wash hands and face again. If showers are available, take a shower and wash hair. If shower facilities are not available at the work site, shower immediately at home and wash hair.

VI. *Housekeeping - Paragraph (H)*

Your employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. Vacuuming is the preferred method of meeting this requirement, and the use of compressed air to clean floors and other surfaces is generally prohibited unless removal with compressed air is done in conjunction with ventilation systems designed to contain dispersal of the lead dust. Dry or wet sweeping, shoveling, or brushing may not be used except where vacuuming or other equally effective methods have been tried and do not work. Vacuums must be used equipped with a special filter called a high-efficiency particulate air (HEPA) filter and emptied in a manner that minimizes the reentry of lead into the workplace.

VII. *Hygiene Facilities and Practices - Paragraph (I)*

The standard requires that hand washing facilities be provided where occupational exposure to lead occurs. In addition, change areas, showers (where feasible), and lunchrooms or eating areas are to be made available to workers exposed to lead above the PEL. Your employer must assure that except in these facilities, food and beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied, where airborne exposures are above the PEL. Change rooms provided by your employer must be equipped with separate storage facilities for your protective clothing and equipment and street clothes to avoid cross-contamination. After showering, no required protective clothing or equipment worn during the shift may be worn at home. It is important that contaminated clothing or equipment be removed in change areas and not to be worn home or you will extend your exposure to your family since lead from your clothing can accumulate in your house, car, etc.

Lunchrooms or eating areas may not be entered with protective clothing or equipment unless surface dust has been removed by vacuuming, downdraft booth, or other cleaning method. Finally, workers exposed above the PEL must wash both their hands and faces prior to eating, drinking, smoking or applying cosmetics.

All of the facilities and hygiene practices just discussed are essential to minimize additional sources of lead absorption from inhalation or ingestion of lead that may accumulate on you, your clothes, or your possessions. Strict compliance with these provisions can virtually eliminate several sources of lead exposure that significantly contribute to lead absorption.

VIII. *Medical Surveillance - Paragraph (J)*

The medical surveillance program is part of the standard's comprehensive approach to the prevention of lead-related disease. Its purpose is to supplement the main thrust of the standard that is aimed at minimizing airborne concentrations of lead and sources of ingestion. Only medical surveillance can determine if the other provisions of the standard have effectively protected you as an individual. Compliance with the standard's provision will protect most workers from the adverse effects of lead exposure, but may not be satisfactory to protect individual workers (1) who have high body burdens of lead acquired over past years, (2) who have additional uncontrolled sources of non-occupational lead exposure, (3) who exhibit unusual variations in lead absorption rates, or (4) who have specific non-work related medical conditions which could be aggravated by lead exposure (e.g., renal disease, anemia). In addition, control systems may fail, or hygiene and respirator programs may be inadequate. Periodic medical surveillance of individual workers will help detect those failures. Medical surveillance will also be important to protect your reproductive ability-regardless of whether you are a man or woman.

All medical surveillance required by interim final standards must be performed by or under the supervision of a licensed physician. The employer must provide required medical surveillance without cost to team members and at a reasonable time and place. The standard's medical surveillance program has two parts - periodic biological monitoring and medical examinations. Your employer's obligation to offer you medical surveillance is triggered by the results of the air monitoring program. Full medical surveillance must be made available to all team members who are or may be exposed to lead in excess of the action level for more than 30 days a year and whose blood lead level exceeds 40 ug/dl. Initial medical surveillance consisting of blood sampling and analysis for lead and zinc protoporphyrin must be made available to all team members exposed at any time (1 day) above the action level.

Biological monitoring under the standard must be provided at least every 2 months for the first 6 months and every 6 months thereafter until your blood lead level is below 40 ug/dl. A zinc protoporphyrin (ZPP) test is a very useful blood test that measures an adverse metabolic effect of lead on your body and is therefore an indicator of lead toxicity.

If your BLL exceeds 40 ug/dl the monitoring frequency must be increased from every 6 months to at least every 2 months and not reduced until two consecutive BLLs indicate a blood lead level below 40 ug/dl. Each time your BLL is determined to be over 40 ug/dl, your employer must notify you of this in writing within five working days of his or her receipt of the test results. The employer must also inform you that the standard requires temporary medical removal with economic protection when your BLL exceeds 50 ug/dl. (see discussion of Medical Removal Protection-Paragraph (K).) Anytime your BLL exceeds 50 ug/dl your employer must make available to you within two weeks of receipt of these test results a second follow-up BLL test to confirm your BLL. If the two tests both exceed 50 ug/dl, and you are temporarily removed, then your employer must make successive BLL tests available to you on a monthly basis during the period of your removal.

Medical examinations beyond the initial one must be made available on an annual basis if your blood lead level exceeds 40 ug/dl at any time during the preceding year and you are being exposed above the airborne action level of 30 ug/m³ for 30 or more days per year. The initial examination will provide information to establish a baseline to which subsequent data can be compared.

An initial medical examination to consist of blood sampling and analysis for lead and zinc protoporphyrin must also be made available (prior to assignment) for each team member being assigned for the first time to an area where airborne concentration of lead equals or exceeds the action level at any time. In addition, a medical examination or consultation must be made available as soon as possible if you notify your employer that you are experiencing signs or symptoms commonly associated with lead poisoning or that you have difficulty breathing while wearing a respirator or during a respirator fit test. You must also be provided a medical examination or consultation if you notify your employer that you desire medical advice concerning the effects of current or past exposure to lead on your ability to procreate a healthy child.

Finally, appropriate follow-up medical examinations or consultations may also be provided for team members who have been temporarily removed from exposure under the medical removal protection provisions of the standard. (See Part IX, below.)

The standard specifies the minimum content of pre-assignment and annual medical examinations. The content of other types of medical examinations and consultations is left up to the sound discretion of the examining physician. Pre-assignment and annual medical examinations must include (1) a detailed work history and medical history; (2) a thorough physical examination, including an evaluation of your pulmonary status if you will be required to use a respirator; (3) a blood pressure measurement; (4) a series of laboratory tests designed to check your blood chemistry and your kidney function. In addition, at any time upon your request, a laboratory evaluation of male fertility will be made (microscopic examination of a sperm sample), or a pregnancy test will be given.

The standard does not require that you participate in any of the medical procedures, tests, etc., which your employer is, required to make available to you. Medical surveillance can, however, play a very important role in protecting your health. You are strongly encouraged, therefore, to participate in a meaningful fashion. The standard contains a multiple physician review mechanism that will give you a chance to have a physician of your choice directly participate in the medical surveillance program. If you are dissatisfied with an examination by a physician chosen by your employer, you can select a second physician to conduct an independent analysis. The two doctors would attempt to resolve any differences of opinion, and select a third physician who conducts medical surveillance under the lead standard-unless you and your employer can agree on the choice of a physician or physicians. Some companies and unions have agreements in advance, for example, to use certain independent medical laboratories or panels of physicians. Any of these arrangements are acceptable so long as required medical surveillance is made available to workers.

The standard requires your employer to provide certain information to a physician to aid in his or her examination of you. This information includes (1) the standard and its appendices, (2) a description of your duties as they relate to occupational lead exposure, (3) your exposure level or anticipated exposure level, (4) a description of any personal protective equipment you wear, (5) prior blood lead level results, and (6) prior written medical opinions concerning you that the employer has. After a medical examination or consultation the physician must prepare a written report which must contain (1) the physician's opinion as to whether you have any medical condition which places you at increased risk of material impairment to health from exposure to lead, (2) any recommended special protective measures to be provided to you, (3) any blood lead level determinations, and (4) any recommended limitation on your use of respirators. This last element must include a determination of whether you can wear a powered air-purifying respirator (PAPR) if you are found unable to wear a negative pressure respirator.

The medical surveillance program of the interim lead standard may at some point in time serve to notify certain workers that they have acquired a disease or other adverse medical condition as a result of occupational lead exposure. If this is true, these workers might have legal rights to compensation from public agencies, their employers, firms that supply hazardous products to their employers, or other persons. Some states have laws, including worker compensation laws, which disallow a worker who learns of a job-related health impairment to sue, unless the worker sues within a short period of time after learning of the impairment. (This period of time may be a matter of months or years.) An attorney can be consulted about these possibilities. It should be stressed that OSHA is in no way trying to either encourage or discourage claims or lawsuits. However, since results of the standard's medical surveillance program can significantly affect the legal remedies of a worker who has acquired a job-related disease or impairment, it is proper for OSHA to make you aware of this.

The medical surveillance section of the standard also contains provisions dealing with chelation. Chelation is the use of certain drugs (administered in pill form or injected into the body) to reduce the amount of lead absorbed in body tissues. Experience accumulated by medical and scientific communities has largely confirmed the effectiveness of this type of therapy for the treatment of very severe lead poisoning. On the other hand, it has also been established that there can be a long list of extremely harmful side effects associated with the use of chelating agents. The medical community has balanced the advantages and disadvantages resulting from the use of chelating agents in various circumstances and has established when the use of these agents is acceptable. The standard includes these accepted limitations due to a history of abuse of chelation therapy by some lead companies. The most widely used chelating agents are calcium disodium EDTA, (CaNa₂ EDTA), calcium disodium versenate (versenate), and d-penicillamine (pencillamine or cupramine).

The standard prohibits "prophylactic chelation" of any team member by any person the employer retains, supervises or controls. "Prophylactic chelation" is the routine use of chelating or similarly acting drugs to prevent elevated blood lead levels in workers who are occupationally exposed to lead, or the use of these

drugs to routinely lower blood lead levels to predesignated concentrations believed to be "safe". It should be emphasized that where an employer takes a worker who has no symptoms of lead poisoning and has chelation carried out by a physician (either inside or outside of a hospital) solely to reduce the worker's blood lead level, that will generally be considered prophylactic chelation. The use of a hospital and a physician does not mean that prophylactic chelation is not being performed. Routine chelation to prevent increased or reduce current blood lead levels is unacceptable whatever the setting.

The standard allows the use of "therapeutic" or "diagnostic" chelation if administered under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring. Therapeutic chelation responds to severe lead poisoning where there are marked symptoms. Diagnostic chelation involved giving a patient a dose of the drug then collecting all urine excreted for some period of time as aid to the diagnosis of lead poisoning.

In cases where the examining physician determines that chelation is appropriate, you must be notified in writing of this fact before such treatment. This will inform you of a potentially harmful treatment, and allow you to obtain a second opinion.

IX. Medical Removal Protection - Paragraph (K)

Excessive lead absorption subjects you to increased risk of disease. Medical removal protection (MRP) is a means of protecting you when, for whatever reasons, other methods, such as engineering controls, work practices, and respirators, have failed to provide the protection you need. MRP involves the temporary removal of a worker from his or her regular job to a place of significantly lower exposure without any loss of earnings, seniority, or other employment rights or benefits. The purpose of this program is to ease further lead absorption and allow your body to naturally excrete lead that has previously been absorbed. Temporary medical removal can result from an elevated blood lead level, or a medical opinion. For up to 18 months, or for as long as the job the team member was removed from lasts, protection is provided as a result of either form of removal. The vast majority of removed workers, however, will return to their former jobs long before this eighteen month period expires.

You may also be removed from exposure even if your blood lead level is below 50 ug/dl if a final medical determination indicates that you temporarily need reduced lead exposure for medical reasons. If the physician who is implementing your employers medical program makes a final written opinion recommending your removal or other special protective measures, your employer must implement the physician's recommendation. If you are removed in this manner, you may only be returned when the doctor indicates that it is safe for you to do so.

The standard does not give specific instructions dealing with what an employer must do with a removed worker. Your job assignment upon removal is a matter for you, your employer and your union (if any) to work out consistent with existing procedures for job assignments. Each removal must be accomplished in a manner consistent with existing collective bargaining relationships. Your employer is given broad discretion to implement temporary removals so long as no attempt is made to override existing agreements. Similarly, a removed worker is provided no right to veto an employer's choice that satisfies the standard.

In most cases, employers will likely transfer team members to other jobs with sufficiently low lead exposure. Alternately, a worker's hours may be reduced so that the time weighted average exposure is reduced, or he or she may be temporarily laid off if no other alternative is feasible.

In all of these situations, MRP benefits must be provided during the period of removal - i.e., you continue to receive the same earnings, seniority, and other rights and benefits you would have had if you had not been removed. Earnings include more than just your base wage; it includes overtime, shift differentials, incentives, and other compensation you would have earned if you had not been removed. During the period of removal you must also be provided with appropriate follow-up medical surveillance. If you were removed because your blood lead level was too high, you must be provided with a monthly blood test. If a medical opinion caused your removal, you must be provided with medical tests or examinations that the doctor believes to be appropriate. If you do not participate in this follow up medical surveillance, you may lose your eligibility for MRP benefits.

When you are medically eligible to return to your former job, your employer must return you to your "former job status". This means that you are entitled to the position, wages, benefits, etc., you would have

had if you had not been removed. If you would still be in your old job if no removal had occurred that is where you go back. If not, you are returned consistent with whatever job assignment discretion your employer would have had if no removal had occurred. MRP only seeks to maintain your rights, not expand them or diminish them. If you are removed under MRP and you are also eligible for worker compensation or other compensation for lost wages, your employer's MRP benefits obligation is reduced by the amount that you actually receive from these other sources. This is also true if you obtain other employment during the time you are laid off with MRP benefits.

The standard also covers situations where an employer voluntarily removes a worker from exposure to lead due to the effects of lead on the team member's medical condition, even though the standard does not require removal. In these situations MRP benefits must still be provided as though the standard required removal. Finally, it is important to note that in all cases where removal is required, respirators cannot be used as a substitute. Respirators may be used before removal becomes necessary, but not as an alternative to a transfer to a low exposure job, or to a lay-off with MRP benefits.

X. Team Member Information and Training - Paragraph (L)

Your employer is required to provide information and training program for all team members exposed to lead above the action level or who may suffer skin or eye irritation from lead compounds such as lead arsenate or lead azide. The program must train these team members regarding the specific hazards associated with their work environment, protective measures which can be taken, including the contents of any compliance plan in effect, the danger of lead to their bodies (including their reproductive systems), and their rights under the standard. All team members must be trained prior to initial assignment to areas where there is a possibility of exposure over the action level.

This training program must also be provided at least annually thereafter unless further exposure above the action level will not occur.

XI. Signs - Paragraph (M)

The standard requires that the following warning sign be posted in work areas where the exposure to lead exceeds the PEL:

WARNING LEAD WORK AREA POISON NO SMOKING OR EATING

These signs are to be posted and maintained in a manner that assures that the legend is readily visible.

XII. Recordkeeping - Paragraph (N)

Your employer is required to keep all records of exposure monitoring for airborne lead. These records must include the name and job classification of team members measured, details of the sampling and analytical techniques, the results of this sampling, and the type of respiratory protection being worn by the person sampled. Such records are to be retained for at least 30 years. Your employer is also required to keep all records of biological monitoring and medical examination results. These records must include the names of the team members, the physician's written opinion, and a copy of the results of the examination. Medical records must be preserved and maintained for the duration of employment plus 30 years. However, if the team member's duration of employment is less than one year, the employer need not retain that team member's medical records beyond the period of employment if they are provided to the team member upon termination of employment.

Recordkeeping is also required if you are temporarily removed from your job under the medical removal protection program. This record must include your name and social security number, the date of your removal and return, how the removal was or is being accomplished, and whether or not the reason for the removal was an elevated blood lead level. Your employer is required to keep each medical removal record only for as long as the duration of a team member's employment.

The standard requires that if you request to see or copy environmental monitoring, blood lead level monitoring, or medical removal records, they must be made available to you or to a representative that you authorize. Your union also has access to these records. Medical records other than BLLs must also be provided upon request to you, to your physician or to any other person whom you may specifically

designate. Your union does not have access to your personal medical records unless you authorize their access.

XIII. Observation of Monitoring - Paragraph (O)

When air monitoring for lead is performed at your workplace as required by this standard, your employer must allow you or someone you designate to act as an observer of the monitoring. Observers are entitled to an explanation of the measurement procedure, and to record the results obtained. Since results will not normally be available at the time of the monitoring, observers are entitled to record or receive the results of the monitoring when returned by the laboratory. Your employer is required to provide the observer with any personal protective devices required to be worn by team members working in the area that is being monitored. The employer must require the observer to wear all such equipment and to comply with all other applicable safety and health procedures.

XIV. Effective Date - Paragraph (P)

The standard's effective date is June 3, 1993. Employer obligation under the standard begin as of that date with full implementation of engineering controls as soon as possible but no later than within 4 months, and all other provisions completed as soon as possible, but no later than within 2 months from the effective date.

XV. For Additional Information

- A. A copy of the interim standard for lead in construction can be obtained, free of charge by calling or writing OSHA Office of Publication, Room N-3101, United States Department of Labor, Washington, DC 20210: Telephone (202) 219-4667.
- B. Additional information about the standard, its enforcement, and your employer's compliance can be obtained from the nearest OSHA Area Office listed in your telephone directory under United States Government/Department of Labor.

Health Effects and MSDS:

Lead

I. SUBSTANCE IDENTIFICATION

A. "Substance": Pure lead (Pb) is a heavy metal at room temperature and pressure and is a basic chemical element. It can combine with various other substances to form numerous lead compounds.

B. "Compounds Covered by the Standard": The word "lead" when used in this interim final standard means elemental lead, all inorganic lead compounds and a class of organic lead compounds called lead soaps. This standard does not apply to other organic lead compounds.

C. "Uses": Exposure to lead occurs in several different occupations in the construction industry, including demolition or salvage of structures where lead or lead - containing materials are present; removal or encapsulation of lead - containing materials, new construction, alteration, repair, or renovation of structures that contain lead or materials containing lead; installation of products containing lead. In addition, there are construction related activities where exposure to lead may occur, including transportation, disposal, storage, or containment of lead or materials containing lead on construction sites, and maintenance operations associated with construction activities.

D. "Permissible Exposure": The permissible exposure limit (PEL) set by the standard is 50 micrograms of lead per cubic meter of air (50 ug/m³), averaged over an 8-hour workday.

E. "Action Level": The interim final standard establishes an action level of 30 micrograms of lead per cubic meter of air (30 ug/m³), averaged over an 8-hour workday. The action level triggers several ancillary provisions of the standard such as exposure monitoring, medical surveillance, and training.

II. HEALTH HAZARD DATA

A. "Ways in which lead enters your body". When absorbed into your body in certain doses, lead is a toxic substance. The object of the lead standard is to prevent absorption of harmful quantities of lead. The standard is intended to protect you not only from the immediate toxic effects of lead, but also from the serious toxic effects that may not become apparent until years of exposure have passed. Lead can be absorbed into your body by inhalation (breathing) and ingestion (eating). Lead (except for certain organic lead compounds not covered by the standard, such as tetraethyl lead) is not absorbed through your skin. When lead is scattered in the air as a dust, fume, or mist it can be inhaled and absorbed through your lungs and upper respiratory tract. Inhalation of airborne lead is generally the most important source of occupational lead absorption. You can also absorb lead through your digestive system if lead gets into your mouth and is swallowed. If you handle food, cigarettes, chewing tobacco, or make-up which have lead on them or handle them with hands contaminated with lead, this will contribute to ingestion. A significant portion of the lead that you inhale or ingest gets into your blood stream. Once in your blood stream, lead is circulated throughout your body and stored in various organs and body tissues. Some of this lead is quickly filtered out of your body and excreted, but some remains in the blood and other tissues. As exposure to lead continues, the amount stored in your body will increase if you are absorbing more lead than your body is excreting. Even though you may not be aware of any immediate symptoms of disease, this lead stored in your tissues can be slowly causing irreversible damage, first to individual cells, then to your organs and whole body systems.

B. "Effects of overexposure to lead" - (1) "Short term (acute) overexposure". Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise which develops quickly to seizures, coma, and death from cardiorespiratory arrest. A short term dose of lead can lead to acute encephalopathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects which take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease which arise after periods of exposure as short as days or as long as several years.

(2) "Long-term (chronic) overexposure". Chronic overexposure to lead may result in severe damage to your blood - forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic there may be severe abdominal pain. Damage to the central nervous system in general and the brain (encephalopathy) in particular is one of the most severe forms of lead poisoning. The most severe, often fatal, form of encephalopathy may be preceded by vomiting, a feeling of dullness progressing to drowsiness and stupor, poor memory, restlessness, irritability, tremor, and convulsions. It may arise suddenly with the onset of seizures, followed by coma, and death. There is a tendency for muscular weakness to develop at the same time. This weakness may progress to paralysis often observed as a characteristic "wrist drop"

or "foot drop" and is a manifestation of a disease to the nervous system called peripheral neuropathy. Chronic overexposure to lead also results in kidney disease with few, if any, symptoms appearing until extensive and most likely permanent kidney damage has occurred.

Routine laboratory tests reveal the presence of this kidney disease only after about two-thirds of kidney function is lost. When overt symptoms of urinary dysfunction arise, it is often too late to correct or prevent worsening conditions, and progression to kidney dialysis or death is possible. Chronic overexposure to lead impairs the reproductive systems of both men and women. Overexposure to lead may result in decreased sex drive, impotence and sterility in men. Lead can alter the structure of sperm cells raising the risk of birth defects. There is evidence of miscarriage and stillbirth in women whose husbands were exposed to lead or who were exposed to lead themselves. Lead exposure also may result in decreased fertility, and abnormal menstrual cycles in women. The course of pregnancy may be adversely affected by exposure to lead since lead crosses the placental barrier and poses risks to developing fetuses. Children born of parents either one of whom were exposed to excess lead levels are more likely to have birth defects, mental retardation, behavioral disorders or die during the first year of childhood. Overexposure to lead also disrupts the blood - forming system resulting in decreased hemoglobin (the substance in the blood that carries oxygen to the cells) and ultimately anemia. Anemia is characterized by weakness, pallor and fatigability as a result of decreased oxygen carrying capacity in the blood.

(3) "Health protection goals of the standard". Prevention of adverse health effects for most workers from exposure to lead throughout a working lifetime requires that a worker's blood lead level (BLL, also expressed as PbB) be maintained at or below forty micrograms per deciliter of whole blood (40 ug/dl). The blood lead levels of workers (both male and female workers) who intend to have children should be maintained below 30 ug/dl to minimize adverse reproductive health effects to the parents and to the developing fetus. The measurement of your blood lead level (BLL) is the most useful indicator of the amount of lead being absorbed by your body. Blood lead levels are most often reported in units of milligrams (mg) or micrograms (ug) of lead (1 mg=1000 ug) per 100 grams (100g), 100 milliliters (100 ml) or deciliter (dl) of blood. These three units are essentially the same. Sometime BLLs are expressed in the form of mg percent or ug percent. This is a shorthand notation for 100g, 100 ml, or dl. (References to BLL measurements in this standard are expressed in the form of ug/dl.)

BLL measurements show the amount of lead circulating in your blood stream, but do not give any information about the amount of lead stored in your various tissues. BLL measurements merely show current absorption of lead, not the effect that lead is having on your body or the effects that past lead exposure may have already caused. Past research into lead - related diseases, however, has focused heavily on associations between BLLs and various diseases. As a result, your BLL is an important indicator of the likelihood that you will gradually acquire a lead - related health impairment or disease. Once your blood lead level climbs above 40 ug/dl, your risk of disease increases. There is a wide variability of individual response to lead, thus it is difficult to say that a particular BLL in a given person will cause a particular effect. Studies have associated fatal encephalopathy with BLLs as low as 150 ug/dl. Other studies have shown other forms of diseases in some workers with BLLs well below 80 ug/dl. Your BLL is a crucial indicator of the risks to your health, but one other factor is also extremely important. This factor is the length of time you have had elevated BLLs. The longer you have an elevated BLL, the greater the risk that large quantities of lead are being gradually stored in your organs and tissues (body burden). The greater your overall body burden, the greater the chances of substantial permanent damage. The best way to prevent all forms of lead - related impairments and diseases -- both short term and long term -- is to maintain your BLL below 40 ug/dl. The provisions of the standard are designed with this end in mind.

Your employer has prime responsibility to assure that the provisions of the standard are complied with both by the company and by individual workers. You, as a worker, however, also have a responsibility to assist your employer in complying with the standard. You can play a key role in protecting your own health by learning about the lead hazards and their control, learning what the standard requires, following the standard where it governs your own actions, and seeing that your employer complies with provisions governing his or her actions.

(4) "Reporting signs and symptoms of health problems". You should immediately notify your employer if you develop signs or symptoms associated with lead poisoning or if you desire medical advice concerning the effects of current or past exposure to lead or your ability to have a healthy child. You should also notify your employer if you have difficulty breathing during a respirator fit test or while wearing a respirator. In each of these cases, your employer must make available to you appropriate medical examinations or consultations. These must be provided at no cost to you and at a reasonable time and place. The standard contains a procedure whereby you can obtain a second opinion by a physician of your choice if your employer selected the initial physician.

General Health Effects of Lead Exposure

You get lead into your body by breathing it in or by swallowing it. Lead particles do not go through the skin, but if lead dust is on your hands it can be accidentally swallowed while eating, drinking, or smoking.

Lead is hazardous when it gets into the bloodstream where it can move around the body. High exposures over a short period of time or lower exposures spread out over longer time periods can cause lead poisoning. Lead can damage the brain and nervous system, kidneys, and reproductive systems. Lead also contributes to high blood pressure. Most of the absorbed lead is eventually stored in the bones where it may stay for decades. Under certain conditions, the lead stored in the bone may leach slowly into the bloodstream.

The early effects of lead poisoning are not specific and resemble the flu symptoms. Short term and long term effects of lead overexposure are listed below.

Lead poisoning is preventable. Many of the health problems caused by lead exposure are reversible if exposure is eliminated or reduced.

SHORT TERM EFFECTS

- Stomach cramps
- Poor appetite
- Irritability/anxiety
- Fatigue
- Muscle or joint pain
- Weakness
- Headache
- Numbness
- Constipation
- Sleep problems
- Impotence/loss of sex drive

LONG TERM EFFECTS

- High blood pressure
- Nerve disorders
- Brain damage
- Kidney damage
- Reproductive damage
- Birth defects

From: www.blueprintproject.org

Guides for Managing Lead and Silica Control Programs in Construction

Cadmium

I. Substance Identification

A. Substance: Cadmium.

B. 8-Hour, Time-weighted-average, Permissible Exposure Limit (TWA PEL):

1. TWA PEL: Five micrograms of cadmium per cubic meter of air 5 ug/m³, time-weighted average (TWA) for an 8-hour workday.

C. Appearance: Cadmium metal-soft, blue-white, malleable, lustrous metal or grayish-white powder. Some cadmium compounds may also appear as a brown, yellow, or red powdery substance.

II. Health Hazard Data

A. Routes of Exposure. Cadmium can cause local skin or eye irritation. Cadmium can affect your health if you inhale it or if you swallow it.

B. Effects of Overexposure.

1. Short-term (acute) exposure: Cadmium is much more dangerous by inhalation than by ingestion. High exposures to cadmium that may be immediately dangerous to life or health occur in jobs where workers handle large quantities of cadmium dust or fume; heat cadmium-containing compounds or cadmium-coated surfaces; weld with cadmium solders or cut cadmium-containing materials such as bolts.

2. Severe exposure may occur before symptoms appear. Early symptoms may include mild irritation of the upper respiratory tract, a sensation of constriction of the throat, a metallic taste and/or a cough. A period of 1-10 hours may precede the onset of rapidly progressing shortness of breath, chest pain, and flu-like symptoms with weakness, fever, headache, chills, sweating and muscular pain. Acute pulmonary edema usually develops within 24 hours and reaches a maximum by three days. If death from asphyxia does not occur, symptoms may resolve within a week.

3. Long-term (chronic) exposure. Repeated or long-term exposure to cadmium, even at relatively low concentrations, may result in kidney damage and an increased risk of cancer of the lung and of the prostate.

C. Emergency First Aid Procedures.

1. Eye exposure: Direct contact may cause redness or pain. Wash eyes immediately with large amounts of water, lifting the upper and lower eyelids. Get medical attention immediately.

2. Skin exposure: Direct contact may result in irritation. Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water. Get medical attention immediately.

3. Ingestion: Ingestion may result in vomiting, abdominal pain, nausea, diarrhea, headache and sore throat. Treatment for symptoms must be administered by medical personnel. Under no circumstances should the employer allow any person whom he retains, employs, supervises or controls to engage in therapeutic chelation. Such treatment is likely to translocate cadmium from pulmonary or other tissue to renal tissue. Get medical attention immediately.

4. Inhalation: If large amounts of cadmium are inhaled, the exposed person must be moved to fresh air at once. If breathing has stopped, perform cardiopulmonary resuscitation. Administer oxygen if available. Keep the affected person warm and at rest. Get medical attention immediately.

5. Rescue: Move the affected person from the hazardous exposure. If the exposed person has been overcome, attempt rescue only after notifying at least one other person of the emergency and putting into effect established emergency procedures. Do not become a casualty yourself. Understand your emergency rescue procedures and know the location of the emergency equipment before the need arises.

III. Team member Information

A. Protective Clothing and Equipment.

1. Respirators: You may be required to wear a respirator for non-routine activities; in emergencies; while your employer is in the process of reducing cadmium exposures through engineering controls; and where engineering controls are not feasible. If respirators are worn in the future, they must have a joint Mine Safety and Health Administration (MSHA) and National Institute for Occupational Safety and Health (NIOSH) label of approval. Cadmium does not have a detectable odor except at levels well above the permissible exposure limits. If you can smell cadmium while wearing a respirator, proceed immediately to fresh air. If you experience difficulty breathing while wearing a respirator, tell your employer.

2. Protective Clothing: You may be required to wear impermeable clothing, gloves, foot gear, a face shield, or other appropriate protective clothing to prevent skin contact with cadmium. Where protective clothing is required, your employer must provide clean garments to you as necessary to assure that the clothing protects you adequately. The employer must replace or repair protective clothing that has become torn or otherwise damaged.

3. Eye Protection: You may be required to wear splash-proof or dust resistant goggles to prevent eye contact with cadmium.

B. Employer Requirements.

1. Medical: If you are exposed to cadmium at or above the action level, your employer is required to provide a medical examination, laboratory tests and a medical history according to the medical surveillance provisions under paragraph (I) of this standard. (See summary chart and tables in this Appendix A.) These tests shall be provided without cost to you. In addition, if you are accidentally exposed to cadmium under conditions known or suspected to constitute toxic exposure to cadmium, your employer is required to make special tests available to you.

2. Access to Records: All medical records are kept strictly confidential. You or your representative is entitled to see the records of measurements of your exposure to cadmium. Your medical examination records can be furnished to your personal physician or designated representative upon request by you to your employer.

3. Observation of Monitoring: Your employer is required to perform measurements that are representative of your exposure to cadmium and you or your designated representative is entitled to observe the monitoring procedure. You are entitled to observe the steps taken in the measurement procedure, and to record the results obtained. When the monitoring procedure is taking place in an area where respirators or personal protective clothing and equipment are required to be worn, you or your representative must also be provided with, and must wear the protective clothing and equipment.

C. Team member Requirements. You will not be able to smoke, eat, drink, chew gum or tobacco, or apply cosmetics while working with cadmium in regulated areas. You will also not be able to carry or store tobacco products, gum, food, drinks or cosmetics in regulated areas because these products easily become contaminated with cadmium from the workplace and can therefore create another source of unnecessary cadmium exposure.

Some workers will have to change out of work clothes and shower at the end of the day, as part of their workday, in order to wash cadmium from skin and hair. Hand washing and cadmium-free eating facilities shall be provided by the employer and proper hygiene should always be performed before eating. It is also recommended that you do not smoke or use tobacco products, because among other things, they naturally contain cadmium. For further information, read the labeling on such products.

Inorganic Arsenic

I. SUBSTANCE IDENTIFICATION

A. Substance. Inorganic Arsenic.

B. Definition. Copper acetoarsenite, arsenic and all inorganic compounds containing arsenic except arsine, measured as arsenic (As).

C. Permissible Exposure Limit. 10 micrograms per cubic meter of air as determined as an average over an 8-hour period. No team member may be exposed to any skin or eye contact with arsenic trichloride or to skin or eye contact likely to cause skin or eye irritation.

D. Regulated Areas. Only team members authorized by your employer should enter a regulated area.

II. HEALTH HAZARD DATA

A. Comments. The health hazard of inorganic arsenic is high.

B. Ways in which the chemical affects your body. Exposure to airborne concentrations of inorganic arsenic may cause lung cancer, and can be a skin irritant. Inorganic arsenic may also affect your body if swallowed. One compound in particular, arsenic trichloride, is especially dangerous because it can be absorbed readily through the skin. Because inorganic arsenic is a poison, you should wash your hands thoroughly prior to eating or smoking.

III. PROTECTIVE CLOTHING AND EQUIPMENT

A. Respirators. Respirators will be provided by your employer at no cost to you for routine use if your employer is in the process of implementing engineering and work practice controls or where engineering and work practice controls are not feasible or insufficient. You must wear respirators for non-routine activities or in emergency situations where you are likely to be exposed to levels of inorganic arsenic in excess of the permissible exposure limit. Since how well your respirator fits your face is very important, your employer is required to conduct fit tests to make sure the respirator seals properly when you wear it. These tests are simple and rapid and will be explained to you during training sessions.

B. Protective clothing. If you work in a regulated area, your employer is required to provide at no cost to you, and you must wear, appropriate, clean, protective clothing and equipment. The purpose of this equipment is to prevent you from bringing to your home arsenic-contaminated dust and to protect your body from repeated skin contact with inorganic arsenic likely to cause skin irritation. This clothing should include such items as coveralls or similar full-body clothing, gloves, shoes or coverlets, and aprons. Protective equipment should include face shields or vented goggles, where eye irritation may occur.

IV. HYGIENE FACILITIES AND PRACTICES

You must not eat, drink, smoke, chew gum or tobacco, or apply cosmetics in the regulated area, except that drinking water is permitted. If you work in a regulated area your employer is required to provide lunchrooms and other areas for these purposes.

If you work in a regulated area, your employer is required to provide showers, washing facilities, and change rooms. You must wash your face and hands before eating and must shower at the end of the work shift. Do not take used protective clothing out of change rooms without your employer's permission. Your employer is required to provide for laundering or cleaning of your protective clothing.

V. SIGNS AND LABELS

Your employer is required to post warning signs and labels for your protection. Signs must be posted in regulated areas. The signs must warn that a cancer hazard is present, that only authorized team members may enter the area, and that no smoking or eating is allowed, and that respirators must be worn.

VI. MEDICAL EXAMINATIONS

If your exposure to arsenic is over the Action Level (5 mg/m³) -- (including all persons working in regulated areas) at least 30 days per year, or you have been exposed to arsenic for more than 10 years over the Action Level, your employer is required to provide you with a medical examination. The examination shall be every 6 months for team members over 45 years old or with more than 10 years exposure over the Action Level and annually for other covered team members. The medical examination must include a medical history; a chest x-ray; skin examination and a nasal examination. The examining physician will provide a written opinion to your employer containing the results of the medical exams. You should also receive a copy of this opinion. The physician must not tell your employer any conditions he detects unrelated to occupational exposure to arsenic but must tell you those conditions.

VII. OBSERVATION OF MONITORING

Your employer is required to monitor your exposure to arsenic and you or your representatives are entitled to observe the monitoring procedure. You are entitled to receive an explanation of the measurement procedure, and to record the results obtained. When the monitoring procedure is taking

place in an area where respirators or personal protective clothing and equipment are required to be worn, you must also be provided with and must wear the protective clothing and equipment.

VIII. ACCESS TO RECORDS

You or your representative is entitled to records of your exposure to inorganic arsenic and your medical examination records if you request your employer to provide them.

IX. TRAINING AND NOTIFICATION

Additional information on all of these items plus training as to hazards of exposure to inorganic arsenic and the engineering and work practice controls associated with your job will also be provided by your employer. If you are exposed over the permissible exposure limit, your employer must inform you of that fact and the actions he is taking to reduce your exposures.

Hexavalent Chromium

NIOSH

Hexavalent chromium (Cr(VI)) compounds are a group of chemical substances that contain the metallic element chromium in its positive-6 valence (hexavalent) state. Occupational exposures to Cr(VI) occur during the production of stainless steel, chromate chemicals, and chromate pigments. Cr(VI) exposures also occur during other work activities such as stainless steel welding, thermal cutting, chrome plating, painting, and coating processes.

NIOSH considers all Cr(VI) compounds to be potential occupational carcinogens. An increased risk of lung cancer has been demonstrated in workers exposed to Cr(VI) compounds. Other adverse health effects associated with Cr(VI) exposure include dermal irritation, skin ulceration, allergic contact dermatitis, occupational asthma, nasal irritation and ulceration, perforated nasal septa, rhinitis, nosebleed, respiratory irritation, nasal cancer, sinus cancer, eye irritation and damage, perforated eardrums, kidney damage, liver damage, pulmonary congestion and edema, epigastric pain, and erosion and discoloration of the teeth.

Cr(VI) compounds vary in solubility from those that are readily soluble to those which are practically insoluble in water. In 1975 NIOSH documented the carcinogenic effects of water-insoluble Cr(VI) compounds. The NIOSH 1988 testimony to OSHA on the air contaminants standard recommended that all Cr(VI) compounds, regardless of their degree of solubility in water, be considered occupational carcinogens. NIOSH is currently reviewing and evaluating the available information on Cr(VI) compounds including the toxicology, health effects, industrial hygiene, and analytical chemistry literature in order to update its 1975 criteria document on Cr(VI).

CONTENT OF MEDICAL EXAM

The content of the medical exam shall be determined by an examining physician and must include at least the following:

1. Fertility test or pregnancy test if requested by the team member
2. Detailed work history and medical history
3. Thorough physical examination
4. Pulmonary status
5. Blood pressure measurement
6. Blood lead testing with ZPP
7. Hemoglobin and hematocrit determinations, red cell indices, and examination of peripheral smear morphology
8. Blood urea nitrogen
9. Serum creatinine
10. Routine urinalysis with microscopic examination (this is not a drug test)
11. Other relevant testing determined by the examining physician

Give two copies of this to team member before they go to their medical evaluation.

Note: For guidance on Cadmium, Hexavalent Chromium, or Arsenic medical exams/ medical surveillance and when they are required, contact the Corporate Safety Department

BOILER WORK GUIDELINES

Since 1990 Cianbro has conducted air monitoring for lead exposure in boilers. Most recently, over the past two to three years, we have greatly improved our work practice controls and find that our exposure to the health hazards of lead in most boiler work is minimal, well below the current action levels established by OSHA. Over time, we have developed significant work history with medical surveillance and air monitoring results and have a good understanding of the lead and heavy metal issues in boiler work. Because of that, the following guidelines have been established in conjunction with our Lead and Other Heavy Metal Protection Safety Policy and Procedure and meeting what we believe is the intent and full compliance with the OSHA Lead Standard.

I. Planning Program Checklist for Boiler Work

- 1. A written site specific activity plan covering hazardous substances present in our work area must be done. Use the plan page included in the current Activity Plan format or equivalent to meet the OSHA and Cianbro requirements. Specific activities must be identified to determine what levels of respiratory, PPE, ventilation, hygiene, etc. will be required during the initial assessment periods of each activity. (Examples of activities are welding, cutting, burning, scraping, grinding, sweeping, vacuuming, needle gunning, etc.)
- 2. A competent person, capable of conducting training, identifying existing and predictable hazardous substance(s) in the work area and who has authority to take prompt corrective measures, must be identified and present during the work activities.
- 3. To reduce exposure to our team members, it is essential for the client to thoroughly clean the boiler before we enter. This can include explosive techniques, power wash, and vacuum. It is to our advantage to work with our clients to clean the boiler as effectively as possible and to help them understand why it will benefit them as well as Cianbro (productivity improvements during maintenance outages, reduced risk to their team members, etc.). If the boiler is not thoroughly cleaned, expect airborne levels above the PEL and plan accordingly.
- 4. Appropriate medical surveillance must be in place prior to the work. Team members selected to perform work in boilers must be current with Cianbro's Medical Surveillance Lead Program (Reference section F of this Safety Policy and Procedure) at a minimum. Team members must have had a blood lead/ZPP test current within the last 12 months and a previous one with the results <40 ug/dl. Team members who have received a blood lead result >40 ug/dl must have been re-tested with results from two consecutive blood leads <40 ug/dl before available for work assignments in a lead work area. Also any team member who has received a blood lead level >50 ug/dl must have completed Cianbro's final medical determination (written medical opinion) on their health status. (Reference Cianbro's latest "Blood Lead Historical Report" for team member status.)
- 5. Boiler ash samples must be current and reflect the specific type(s) of fuel currently being used in the boiler process. Test the ash for the eight RCRA metals plus vanadium. Attach documentation to the activity plan. If a recent ash sample analysis (current within one year and boiler operating conditions have not changed) is available from the host it can be used.
- 6. Team member air monitoring results from lead sampling of specific work activities under similar work conditions, must be current within the past 12 months and show lead results below the action level.
- 7. Initial and ongoing air monitoring must be conducted, including all heavy metals known to be present, to confirm expected levels are less than the action level. If levels are greater than the action level, refer to Appendix C of this Safety Policy and Procedure and implement those minimum actions required if results are greater than the action level (to make sure we are using appropriate levels of PPE. Ongoing air monitoring can be discontinued if test(s) show levels less than the action level. If activity conditions change, then air monitoring must continue until two or more test results show levels less than the action level.

- 8. Wash facilities must be provided and located at a lead control point (as close as possible) coming from the lead work area. (Refer to Appendix C of this Safety Policy and Procedure and implement those minimum actions required based on the air monitoring results.)
- 9. Engineering and work practice controls must be implemented. (To reduce exposure to below the PEL when feasible.) Document in activity plan.
- 10. Minimum respiratory protection (half face, P100 (HEPA) cartridge) is required to start unless results from air monitoring show below the action level for lead and other potential airborne hazards (other heavy metals). For trash to energy boilers minimum respiratory protection must be based on the table in Appendix A of this Safety Policy and Procedure and must always start with at least half face with P100 cartridges.

CAUTION: There may be other hazards present like cadmium, hexavalent chromium, arsenic and/or vanadium that would require special PPE considerations and monitoring (competent person determination).

- 11. Good hygiene practices are essential for all work activities in and around boilers where unclean surfaces/areas exist and exposure is expected because of the specific activity.

Inhalation and ingestion are the two primary routes of entry into the body creating a health hazard. Skin contact of some substances like arsenic can cause dermatitis with burning, itching, swelling, and skin eruptions.

Minimum requirements include providing for: Running water, soap (pumpable preferred), clean wipes (towels) and trash containers for waste ensuring that team members wash hands and face prior to eating, drinking, smoking, chewing, and leaving the work area/project site.

- 12. It is strongly recommended that as a part of your work practice controls you establish at your lead (or other regulated metal) control area check point (around wash facilities) a HEPA vacuum so team members exiting the lead control area can vacuum off their PPE clothing. Otherwise team members must remove their protective clothing before entering eating/break areas or at the end of their shifts. Time must be allowed during regular work hours, including breaks, for team members to change and wash up going in and out of lead control work areas.

- 13. No tobacco, food, drinks or cosmetics allowed in the lead control work area(s).

- 14. Training must be conducted prior to starting work covering Cianbro's activity plan, HAZCOM for lead (and any other heavy metal known to be present), activities that could result in exposures to hazardous substances above their assigned action levels, engineering controls, and the team member awareness standard summary from Appendix D) of this Safety Policy and Procedure

- 15. Post lead (and cadmium or arsenic if present) work signs.

- 16. A rigorous housekeeping effort is necessary. Regularly cleaning up ash dust and ash containing debris should be accomplished. NO DRY SWEEPING!

Wet sweep or HEPA vacuum only.

- 17. Any waste generated must be controlled, stored, labeled, and shipped in accordance with Cianbro's Hazardous Materials and Waste Management Program and any Federal, State or Local requirements.

A designated generator of hazardous waste must be identified. Our contract with the host/client to do the work should clearly state a representative party (i.e. DOT) acceptance of responsibility for hazardous waste collection, storage, shipping and disposal. Lead, cadmium, vanadium and arsenic (and other heavy metals) are all considered to be hazardous substances and depending on concentrations must be disposed of as a hazardous waste in accordance with EPA and Cianbro standards. Follow the requirements in the Cianbro Hazardous Materials/ Hazardous Waste Management Handbook (Cookbook).

NOTE: Adequate time must be allowed for good hygiene practices so as not to interfere with team member breaks, lunch and shift completion times.

II. Boiler Work Minimum Requirements (excluding trash to energy boilers):

(Starting boiler work with lead present at any level from ash sample analysis.)

1. Trigger Tasks: (See typical lead activities - Appendix A of this Safety Policy and Procedure)
2. Current team members must have had a blood lead/ZPP test current within the last 12 months for the duration of the planned work with previous results of <40 ug/dl. New team members must receive blood lead/ZPP tests every two months for the first six months then annually if expected to be exposed to lead above the action level for 30 days or more in a 12-month period.
3. Respiratory protection per Attachment B or based on historical data for the particular boiler current within 12 months.
4. Establish lead (and arsenic or cadmium if present) area controls checkpoint with wash facilities and HEPA vacuum. (Post instructional signs.)
5. Coveralls or Tyvek suits and gloves.
6. Provide for engineering, administrative and work practice controls as feasible.
7. No tobacco, food, drinks or cosmetics in lead work areas.
8. Conduct hazardous communication and lead program training.
9. Current with requirements of respiratory status (i.e.: medical approval, PFT, fit testing).
10. Conduct exposure assessment air monitoring for each trigger task until two consecutive tests at least 7 days apart show less than the action level and activity conditions do not change. One exposure assessment test conducted during work operations on any prior boiler work within the last year, under work place conditions closely resembling current work operations can be used as one of the two required. Documentation of air monitoring results must be reviewed by a competent person and on site.
11. Exposure assessment air monitoring results that show levels > the action level will require following Appendix C of this lead Safety Policy and Procedure.
12. Lead work activity plan.

III. Minimum Requirements For Other Tasks: (Lead work activities like inspections, erecting staging, etc. producing no airborne exposures, with no other trigger tasks going on simultaneously). Minimum requirements:

1. Establish lead area control checkpoint.
2. Coveralls or tyvek suits and gloves.
3. Respiratory protection per Attachment B.
4. No tobacco, food, drinks or cosmetics in lead work areas.
5. Conduct hazardous communications training.
6. Written lead and other heavy metal work activity plan.
7. Air monitoring.

Table of Permissible Exposure Limits and Action Levels

	Permissible Exposure Limit ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	TLV ($\mu\text{g}/\text{m}^3$)
Arsenic	10	5	10
Barium	500		500
Cadmium	5	2.5	10 2 (respirable fraction)
Chromium: Metal, II, III	1000 (metal) 500 (II or III)		500 500
Chromium VI (Hexavalent)	5.0	2.5	10 (insoluble compounds)
Lead	50	30	50
Mercury (metal and compounds excluding organo compounds)	C 100 (ceiling limit)		25 (elemental and inorganic forms)
Selenium	200		
Silver	10		
Vanadium (as Pentoxide): Dust Fume	C 500 (ceiling limit) C 100 (ceiling limit)		50 50

Policy Number: 007**Authorized By:** Michael W. Bennett**Title:** Watch for Fire, Smoke and Sparks**Effective Date:** 02/01/93Page 1 of 6

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 The purpose of this policy is to provide guidance and requirements for all work at Cianbro sites involving potential fire or explosion.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 NFPA: National Fire Protection Association
- 4.2 Incipient Stage Fire: A fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers or a small water hose without the need for protective clothing or breathing apparatus.

5 Policy

- 5.1 Prior to any work, a complete evaluation of the work area must be done to identify any fire hazards that may exist.

6 Responsibilities

- 6.1 Corporate Safety is responsible for maintaining this document.

7 Watch for Fire, Smoke and Sparks Index

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7.1 Welding, torch cutting and grinding activities are frequently performed on Cianbro work sites. These and other flame and heat producing activities are referred to as hot work. Hot Work can be extremely costly as it relates to property damage but more importantly can cause serious injury to the people involved. With this in mind, hot work cannot be conducted unless all applicable provisions of this policy are followed.

7.2 Eliminating Potential Fire Hazards

7.2.1 Planning

- Prior to starting the work, a complete evaluation of the work site must be done by the supervisor to identify any hazards that may exist.

Examples...

- Combustible solids, liquids or dusts.
- Possible explosive mixtures of gases or vapors.
- Oxygen enriched atmospheres.
- Paper, cardboard, rags, etc.
- Flammable chemicals, gasoline, thinners, or paints: refer to the MSDS for chemicals present in the work area and include any necessary precautions.

7.2.2 Fire hazards and their solutions should be listed on an Activity Plan along with any other precautionary procedures or needs.

Examples...

- Emergency procedures; alarm system, evacuation route and telephone numbers.
- Owner/Client requirements (if applicable)
- Burning permits.
- Select proper extinguishing media: water, portable fire extinguishers, etc.
- Special monitoring equipment.
- Engineering controls: ventilation, welding screens, fire blankets, barricades, etc.
- Personal protective equipment.
- Fire Watch.
- Lock out/Tag out.

7.2.3 Participation is required from all levels to ensure that the plan is developed and is set in motion.

7.2.4 Communication is vital. A well-prepared plan is worthless if it is not communicated to everyone involved.

TAKE THE TIME TO . . .

- Develop a plan.
- Involve subordinates in the planning process.
- Ensure that the plan is communicated to all levels.

7.3 Personal Protection

Protective clothing is a simple means to eliminate exposure to burns.

7.3.1 Welding leathers or fire resistant canvas/wool clothing is recommended when performing any type of hot work activity. Carhartt brand clothing or their equivalent is the next best choice (Make sure there are no loose or frayed threads because they will catch fire). Clothing should cover exposed skin. Avoid pockets and cuffs because they tend to catch slag and sparks. Avoid synthetic or lightweight cotton clothing because they may catch on fire and burn very easily. Burns must be reported immediately so that appropriate first aid and/or medical treatment can be provided. First aid equipment shall be available at all times. Make sure that pant legs are not tucked into the boots keep the tops of boots covered.

7.3.2 Double eye protection is mandatory for all hot work activities. Make sure that the lens shade used is appropriate for the job. Safety glasses are required underneath welding hoods. Tinted face shields are available and add protection for the face as well as the eye.

7.4 Fire Watch Requirements

A Fire watch is required whenever welding or cutting is performed in locations where other than a minor fire might develop, or if any of the following conditions exist:

- Combustible materials are closer than 35 feet to the hot work.
- Combustibles are more than 35 feet away but are easily ignited by sparks.
- Wall or floor openings are within a 35-foot radius that expose combustible material in adjacent areas including concealed spaces in walls or floors.
- Combustible materials are present adjacent to the opposite side of metal partitions, walls, ceilings, or roofs that are likely to be ignited by conduction or radiation.

Anyone assigned to a fire watch position must receive training in hazard identification and the emergency plan prior to their initial assignment and at least annually thereafter. Listed below are some general training aids and specific responsibilities.

7.4.1 The person must be informed of the specific hazards identified in the activity plan.

7.4.2 The emergency, evacuation and alarm plan must be communicated and understood.

7.4.3 The person must ensure that no hot work is started before appropriate fire permits and lockouts have been obtained (if applicable).

7.4.4 The person must be trained in the use of fire extinguishers including the hazards involved in incipient stage fire fighting, the different types of extinguishers, proper care, and inspection requirements. Refer to Section 7.5.

7.4.5 The person must inspect all fire protection equipment such as extinguishers each day before the hot work starts. If there is no firewatch person then the person doing the hot work will do this inspection.

7.4.6 The person must be present when any hot work is being performed and must remain in the work area for at least thirty minutes after hot work is completed.

7.4.7 The person may only be assigned to an area that is constantly in his/her view.

7.4.8 The person should not participate in any other work activities while acting as firewatch.

7.4.9 The person will wear the appropriate personal protective equipment and will monitor protective needs of others such as protection from slag, flash, height related work, etc.

7.4.10 The person will monitor the work area for hazards that may arise as the work progresses.

7.4.11 The individual must be physically capable to handle any emergency.

7.4.12 If there is a fire, call 911 or security try to extinguish the fire with the fire extinguisher. If the fire is not out when extinguisher empty leave the area for a secure area and let the professionals put the fire out.

The fire watch should not be expected to enforce compliance regarding hot work safety. They shall, however, recommend changes to protect against fire starting to his/her immediate supervisor. They are to provide a focused set of eyes that will educate and monitor team members and their work areas to complete the activity without incident.

7.5 Fire Extinguishers

7.5.1 Obsolete Extinguishers

In 1969 American manufacturers stopped making inverting-type extinguishers. They include soda-acid, foam and cartridge operated water extinguishers.

DO NOT USE THESE EXTINGUISHERS!!

Some of their disadvantage's are...

- They cannot be turned off once activated.

- The agent is more corrosive than water.
- They are potentially dangerous. If the discharge hose is blocked, these extinguishers can build up pressure and explode.

7.5.2 Extinguisher Classification

- Class A - Appropriate for use on wood, paper and trash fires.
- Class B - Appropriate for use on flammable liquids, gasoline, oils, paints, garbage, etc.
- Class C - Appropriate for use on electrical fires.
- Class D – Fire extinguishers for use on specific metals.
- Combination ABC - Appropriate for use on class A, B, and C fires. The combination extinguisher is recommended for general use in Cianbro.
A combination extinguisher may not be as effective on a particular class of fire as an extinguisher specifically rated for just that class, but it will work on all three classes.

7.5.3 Extinguisher Inspection

Annual maintenance

Extinguishers must be subjected to maintenance by a competent person/organization every 12 months. The extinguisher's mechanical parts, extinguishing agent and expelling means must be examined and maintained.

Each extinguisher shall have a tag or label attached that indicates the month and year that the inspections, maintenance and recharging were performed and will identify the person performing the service. Tags may not be required if extinguishers are numbered, logged and inspections documented as part of a formal monthly inspection program.

7.5.4 Monthly Inspection

Extinguishers must be inspected monthly. The person doing the inspection must record his/her initials and the date the inspection was completed on the extinguisher. The inspection must include the following items:

- Located in designated place.
- No obstruction to access or visibility.
- Operating instructions on nameplate legible and facing outward.
- Seals and tamper indicators not broken or missing.
- Determine fullness by weighing or "hefting".
- Examine for obvious physical damage, corrosion, leakage, or clogged nozzle.
- Pressure gauge reading or indicator in the operable range or position.

7.5.5 Fire Extinguisher Mounting or Placing

- Portable fire extinguishers must be mounted and located so that they are easily identified and accessible to team members. Mount in a location where it can be not blocked by cabinets, equipment or tools.
- Mount fire extinguishers with brackets or make a stand painted red so that they are easily located throughout the project.
- A fire extinguisher of a rating of at least 10B must be provided within 50 feet of wherever 5 gallons of flammable or combustible liquids or 5 lbs of flammable gas are being used on a jobsite and anywhere hot work is being performed. Fire extinguishers being used with short duration activities do not need to be mounted.

For more details on fire extinguishers refer to NFPA No.10A-1970.

Hot work activities are dangerous.

Do Your Part! Plan the work. Communicate the plan. Train our team members.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 Document available on Cianbro.net/Resources/Forms.

Hot Work Permit Form	SD1036
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9.2 Please Note: Training manual for presenter and student is located on Cianbro.net under Resources| Manuals| Monthly Safety Training Calendar & Material 3.0 March & 3.1 March.

Fire Extinguisher Use – Remember the PASS word:

- Pull the Pin
- Aim Low
- Squeeze the Lever
- Sweep Side-To-Side



Once the Fire is Out:

- Watch the fire area
- If the fire re-ignites repeat
- If you cannot control/confine the fire, LEAVE!
- Notify site management and ensure the fire department inspects the site
- Recharge or replace any fire extinguisher which has been used

Policy Number 008**Authorized By:** Michael W. Bennett**Title:** Safe Rigging Operations**Effective Date:** 01/01/75Page 1 of 18

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 Establishes rigging procedures for movement of any materials by hoisting means.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Competent person:** One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measure to eliminate them. The competent person in charge of the lift is the lift director as per ASME (defined below).
Personnel responsibilities as per ASME American Society of Mechanical Engineers
- All responsibilities listed below shall be assigned in the work site organization. A single individual may perform one or more of these roles.
 - Crane Operator: directly controls the crane's functions
 - Crane Owner: has custodial control of a crane by virtue of lease or ownership
 - Crane User: arranges the crane's presence on a worksite and controls its use there.
 - Lift Director: directly oversees the work being performed by a crane and the associated rigging crew.
 - Site supervisor: exercises supervisory control over the work site on which a crane is being used and over the work that is being performed on that site.
- 4.2 **Load:** The total weight of the materials being hoisted and all rigging and devices attached below the hook of the hoisting equipment, plus any deductions required by the manufacturer of the hoisting equipment (i.e. the block, the cable below the tip, etc.)
- 4.3 **Qualified Rigger:** A person that possesses a recognized degree, certificate or professional standing or has extensive knowledge, training and experience and can successfully demonstrate the ability to solve problems related to rigging loads.
- 4.4 **Qualified Signal Person:** A person that knows and understands the type of signals used at the work site, is competent in using these signals, understands the operations, limitations and dynamics of the equipment being used, knows and understands the signal person qualification requirements and has passed an oral or written test and a practical test. (Please see OSHA Standard 1926 Subpart CC for the entire description.)
- 4.5 **Rigging:** Any device used for attaching a load to a hoisting piece of equipment, such as a crane or chain fall, or the process of attaching the device to the equipment.
- 4.6 **Softener:** A material used to protect the rigging or hoisting cable from being damaged or cut by a sharp surface. Softeners are of two basic types – cut protection and abrasion protection.
- 4.7 **Signal Person:** The person designated to signal the crane operator, to keep an eye on obstructions and to assist the operator in making the hoist.

4.8 WLL: Working Load Limit.

4.9 WSTDA: Web Sling and Tie Down Association

5 Policy

5.1 To maintain the highest level of safe rigging operations, Cianbro Companies will use these procedures during all lifting / hoisting operations. All rigging operations will occur under the control of a competent rigger.

6 Responsibilities

6.1 The Corporate Safety Officer or designee is responsible for providing approval for the use of safe rigging procedures under this policy.

6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.

6.3 Corporate Safety is responsible for maintaining this document.

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7.1 Planning the Activity

Prior to starting any **major rigging** activity, a detailed plan must be developed that identifies any potential hazards and the preventative measures appropriate to **eliminate the hazard**.

All written activity plans must include a complete listing of rigging needed to hoist materials and equipment. The competent person/lift director must be identified by the superintendent/site supervisor at the work location and shall be identified by name in the activity plan. The competent person/lift director must provide input into rigging/hoisting activities and approve activity plans involving rigging.

**All team members must be kept clear of loads about to be lifted and of suspended loads!
Do not lift loads over personnel!**

Listed below are some items to consider when developing the activity plan.

- A. Proper rigging and inspection (see section 7.2).
- B. Identify competent person/lift director.
- C. Weight evaluation.
 - Crane/hoist capacity - load/list charts.
 - **Combined** weight of object and rigging.
- D. Proper crane setup (level, solid ground, etc.). Refer to the Crane Safety Policy and Procedure.
- E. How are hoisting devices to be installed (tuggers, chain falls, etc.)?
- F. Engineering (should lift be calculated and drawn up for educational/training purposes)?
- G. What other work is ongoing below or near the lift (consider barricades, team member alarm system, etc.)?
- H. Refer to Cianbro's Pre-lift checklists for planning loads to be hoisted available on Cianbro.net. See section 9 Related Documents.
- I. Are work locations near public or other areas where special precautions must be planned?

Complex rigging activities require extensive planning, if we are to complete the work without an incident.

7.2 Competent Person/Lift Director:

- 7.2.1 Identification of competent person/lift director - It shall be the responsibility of each project manager/superintendent/site supervisor to ensure every Cianbro work location/project activity has identified a competent person/lift director. This competent rigging person(s) must be identified by name for each activity involving the hoisting of materials and equipment where a load must be mechanically hitched or rigged and lifted. Written activity plans shall include naming the competent person/lift director, a signature of the competent person/lift director and require an inspection to be conducted prior to all lifts. The competent person/lift director will have the authority to take prompt corrective measures to eliminate any unsafe condition.
- 7.2.2 Competent Rigging Person – Shall meet the requirements in Appendix D of this document for each rigger level. All activities involving the hoisting of materials and equipment where a load must be mechanically hitched or rigged and lifted will be done by a competent rigger. Persons who are not competent riggers can only rig under the direct supervision of a competent rigger.

7.3 General Requirements for Rigging Inspection and Use

- 7.3.1 All rigging equipment, (slings, shackles, chain falls / come-a-longs, plate grabs, sheet hooks, etc.), must be **inspected** before each use **by a competent rigging person**.
- 7.3.2 All rigging equipment must be stored off the ground when not in use.
- 7.3.3 Any lifting device used that does not have the manufacturer's certification must be certified by a registered professional engineer. Example: job built sorting/sheet hooks, lifting beams, welded pad eyes, etc.
- 7.3.4 Use of (pelican) sorting hooks to rig loads is prohibited except when sorting sheets and like materials in a lay down yard area and when unloading or loading single pieces from truck to ground / ground to truck.
- 7.3.5 Synthetic slings can be used with sorting hooks provided the sling doesn't come into contact with the load during the lift i.e. Double shackles with hooks.
- 7.3.6 Shackles attached to scale pans, concrete buckets or other apparatus where they remain in place, shall require bolt type shackles or shall have the screw pins wired to prevent loosening.
- 7.3.7 Every rigging activity **must** be supervised by a COMPETENT RIGGING PERSON.
- 7.3.8 All heavy or complex rigging activities must be planned prior to the lift. **Activity plans** shall be developed and reviewed with crew.
- 7.3.9 Any rigging incident or near miss must be reported, investigated and appropriate corrective actions taken. Report incidents to project management, regional safety manager and corporate safety department.
- 7.3.10 Use the appropriate pre lift checklists available on Cianbro.net. These checklists must be completed for weights to be lifted exceeding 75% of the cranes rated load capacity at the working radius and for two crane picks.

7.4 Wire Rope Slings

7.4.1 Inspect Slings Before Each use.

7.4.2 Remove slings from service if any of the following are observed:

- Manufacturer's name or trade mark, the rated capacities for each type of hitch are not legible.
- Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
- Wear or scraping of one-third the original diameter of outside individual wires.
- Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
- Evidence of heat damage (remove from service if exposed to temperatures greater than 500°F. Fiber core wire rope slings shall be removed from service if exposed to temperatures greater than 200°F).
- End attachments that are cracked, deformed or worn.
- Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.
- Corrosion of the rope or end attachments.

7.4.3 Softeners shall be used on all steel slings unless a competent person/lift director determines the softener creates an unsafe condition.

Note: *Softeners must be adequate and appropriate for the application.*

Do not use work gloves, oily rags, etc. for softeners. Consult a competent rigger for proper material.

7.4.4 Malleable iron clips are prohibited for use on Cianbro job sites.

7.4.5 Slings, bridles and bull wires **shall not** have eyes formed using wire rope clips.

7.5 Synthetic Web Slings

7.5.1 WSTDA – WS – 2 states “Synthetic web slings shall always be protected from being cut by corner, edges, protrusions, or abrasive surfaces.”

7.5.2 WSTDA – WS – 2 states “Polyester round slings shall always be protected from being cut by corners, edges, and protrusions.”

7.5.3 Synthetic slings shall not be loaded in excess of their rated capacity. Consideration shall be given to the angle from the horizontal (sling to load angle) which affects rated capacities.

7.5.4 Select proper sling having suitable characteristics for the type of load, hitch, and environment.

7.5.5 Synthetic slings used in basket hitches shall have the load balanced to prevent slippage.

7.5.6 Polyester round slings with cut covers exposing the load bearing yarns shall be removed from service.

7.5.7 With multi sling bridal each leg must have the capacity to carry ½ the load.

7.5.8 To maintain an acceptable D/d ratio at the shackle pin use a shackle one size larger than the sling i.e. with a 6400 # capacity web sling use a ¾” shackle with a capacity of 9500#.

- 7.5.9 Width of attachment hardware (crane hook) cannot be more than 1/3 the length of the sling eye.
- 7.5.10 Synthetic slings can be used in temperatures from -40F to +194F degrees. ASME B30.9 notes that some synthetics do not maintain their breaking strengths at temperatures above 140 degrees F. contact manufacturer at these temps.
- 7.5.11 Wet synthetic slings can be used. Some manufacturers / Rigging trainers deduct 15% from SWL, if needed contact manufacturer.
- 7.5.12 Frozen synthetics CANNOT be used. THAW first.
- 7.5.13 Nylon and polyester are degraded in acid and alkalis environments, check with manufacturer if working in these areas.
- 7.5.14 If a double wrap basket or double wrap choker hitch is used – ensure the 2nd wrap does not cross over the first on the bottom of the load. This condition prevents the hitch from equalizing and sharing the load.
- 7.5.15 Hoist all loads slowly and smoothly to avoid shock loading.
- 7.5.16 With multi leg lifts keep sling angles (horizontal angles) at 60 degrees or greater.
- 7.5.17 Do not use Synthetic slings in Basket hitches for load turning.
- 7.5.18 Use Rigging Hardware with suitable contact width (see chart pg11 – WSTDA-RS-2)
- 7.5.19 Synthetic slings are NOT Field repairable, only manufacturer may repair.
- 7.5.20 Capacities in choker hitch are rated at 120 degrees. For choker angles 90 to 120 =87%, 60 to 89 degrees = 74%; 30 to 59 degrees = 62%; 0 to 29 degrees = 49%. Multiply tags capacity by appropriate %.
- 7.5.21 Removal From Service Criteria
- Tag is missing or not readable
 - Acid or alkali burns
 - Melting, charring, weld spatters (any heat damage) on any part of sling
 - Holes, tears, cuts, or embedded particles
 - Fittings that are pitted, corroded, cracked, stretched, bent, twisted, gouged or broken
 - Knots in any part of sling
 - Excessive abrasive wear
 - Exposed core fibers (round slings)
- 7.5.22 Sling Protection
- A. ASME, WSTDA, the rigging books all say riggers must prevent slings from cutting, leaving the actual methods and materials in the riggers hands.
- B. Sling protection falls into two groups: Abrasion Protection and Cut Protection
- Abrasion Protection: is the “padding” between sling and load, protecting the sling from rough surfaces.
 - Cut Protection: is material that prevents the sling from contacting the load and will not be cut/broken by the compression during lifting.
- C. Examples:
- Abrasion Protection – Fire hose, old slings in 12” pieces, Kevlar stitched or sleeved on web slings.
 - Cut Protection – Litton with blue high density plastic, Corner Max protectors with sewn in material to keep the load corners away from the sling, Newco fabricates steel softeners for wire rope.

- D. Sling protection is required whenever synthetic slings are used unless the competent rigger decides it is not necessary.
- E. Ensure there is a variety of manufactured protection available on site to give riggers options as they need them (Examples: Sling Max Corner Pads, Litton Rigging Gear, Newco 2" Nylons with sewn on Kevlar abrasion covers.)

7.6 Welded Alloy Steel Chains

7.6.1 Frequent (daily – visual) and periodic (monthly and annual - documented) inspections must be performed on all chains used for lifting. This includes chain falls, hoists, as well as multi-leg bridles.

- Ensure identification marking (tag) is affixed and shows size, grade, rated capacity, reach and sling manufacturer's name.
- Inspect chain hook retaining nuts, collars and pins, welds or riveting used to secure the retaining member.
- Hooks, rings, oblong links, pear shaped links, welded or mechanical coupling links or other attachments shall have a rated capacity at least equal to that of the alloy steel chain with which they are used or the sling shall not be used in excess of the rated capacity of the weakest component.
- Makeshift links or fasteners formed from bolts, cords or other such attachments shall not be used.
- Ensure that before using each new, repaired or reconditioned chain sling, including all welded components in the sling assembly, is proof tested by the sling manufacturer or equivalent entity. Cianbro should request and retain a certificate of the proof test.

7.6.2 Remove chains from service if any of the following occur:

- Slings are heated above 1000°F.
- The chain size at any point of any link is less than that required by law (Reference 29 CFR 1926.251).
- Chain links that are twisted, broken, cracked or otherwise damaged.

7.6.3 Periodic Inspections:

- A thorough inspection shall be performed at least once every 12 months for all hoist chains.
- For Gantry and OH Cranes, hoist chains shall be inspected at least monthly by a competent person.
- The assembly shall be removed from service: when excessive wear of chain, excessive chain stretch, excessive twisting or distorting of the links, and whenever wear at any point (of any link) exceeds what was shown in table H-2 of 1926.251.
- Chain hooks suspected of cracks or with other visible defects shall be inspected using dye penetrant, magnetic particle or other suitable means.
- Attention should be directed to the frequency of sling use, the severity of service conditions and the nature of the lifts being made.
- Equipment inspected will be tagged and the inspection documented on a log. The log shall include the date of inspection, a way to identify the chain that was inspected, and will be signed by the person doing the inspection. Records of the most recent month in which each sling was thoroughly inspected shall be available for examination in accordance with 1910.184(e)(3)(ii). Annual inspection tags can be obtained at Pittsfield Supply.

7.6.4 When inspecting chains which are components of chain falls, come-a-longs or hoists, it is necessary to follow manufacturer's instructions for maintenance and inspection, plus:

- Check braking mechanism for evidence of slippage under load.
- Hooks damaged from chemicals, deformations, cracks or having more than 15 percent in excess of normal throat opening, or more than 10 degree twist from the

plane of the unbent hook shall be removed from service. Hooks shall be free to rotate 360°.

- All load bearing components of a hoist should be inspected for damage.
- Frequent and periodic inspections are required. See APPENDIX E - ANSI B30.16-1973 Overhead Hoists.

7.6.5 Limited distribution and use of spreader chain slings in field operations:

- Spreader Chain Slings will be limited, controlled and used for appropriate work activities.
- Safety hooks will be required with sure lock hooks or hooks with a heavy duty safety latch.
- Spreader Chain Slings will be bar coded and tracked as a small tool items and maintained/inspected similar to chain falls.
- Spreader Chain Sling assemblies will be assigned to an individual team member who will be held accountable for daily and monthly inspections and proper use. (Examples: operators assigned to cranes or boom trucks or supervisors working on activities like handling re-bar, sorting steel or lay down yard activities.)
- Daily and monthly inspections will be completed by the individual assigned to the spreader chain sling and documentation will be sent to Pittsfield small tool supply department.
- Annual inspections will be conducted by sending the spreader chain sling assembly to Pittsfield small tool supply department similar to chain falls.
- The use of single-leg assemblies is still prohibited.
- No field repairs or modifications will be allowed except for the replacement of a safety latch or hook. Return the spreader chain assembly to Pittsfield small tool supply department for repairs or modifications.

7.7 Disciplinary Action

7.7.1 Failure to follow Cianbro's safety program requirements outlined in this Safety Policy and Procedure shall result in disciplinary action as outlined in Cianbro's progressive disciplinary procedure.

7.8 OSHA References

- | | |
|----------|---|
| 1926.251 | Rigging Equipment for material handling |
| | (a) General |
| | (b) Alloy Steel Chains |
| | (c) Wire Rope |
| | (d) Natural Rope and Synthetic Fiber |
| | (e) Synthetic Webbing (Nylon, Polyester, and Polypropylene) |
| | (f) Shackles and Hooks |
| 1910.184 | (d) Inspections (daily) |
| | (e) (3),(i) and (ii) Inspections (Periodic) |

7.9 American National Standard Institute (ANSI) Reference

ANSI B30.16-1973 Overhead Hoists

NOTE: Cianbro recommends frequent review of "**Bob's Rigging and Crane Handbook**" and "**Rigging Handbook 3rd Edition J. Klinke**" by each supervisor responsible for Rigging Activities. These may be ordered through Cianbro Institute.

The importance of maintaining an effective rigging inspection program cannot be over emphasized!

PLEASE PARTICIPATE!

Use this safety policy and procedure frequently for training personnel to rig and avoid mishaps.

DO NOT LIFT LOADS OVER PERSONNEL!

7.10 Safety At Home

Each team member using rigging at home is strongly encouraged to use the safe practices described in this policy. Inspect rigging before each use, check capacities of the rigging and the hoisting equipment and make sure that no one is under any suspended load.

8 Budget / Approval Process

8.1 Purchase and maintenance of Cianbro Companies hoisting and rigging equipment is the responsibility of Cianbro Equipment LLC.

8.2 Purchase and maintenance of special or project required rigging equipment and rental equipment is the responsibility of the project.

8.3 Purchasing Requirements: As of January 1, 2004, all steel slings being manufactured were required to have capacity / manufacturer tags attached. Some of the slings we have in use were purchased before that date. We are in the process of tagging a number of those slings. During this process, we are aware that some of the slings that were purchased have no backup to show that they meet our standards. This makes it difficult to accurately rate and tag the slings.

These are the Requirements:

Wire Rope Slings	Material – EIPS, IWRC, domestic wire rope Construction - loop & loop flemish eye splice Tagging - tagged with capacity / manufacturer Conform to OSHA and ANSI standards
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Synthetic / Nylon Slings	Material – grade 8 or 9 nylon webbing Construction - type 3, eye & eye w/ tapered eyes Tagging - tagged with capacity / manufacturer Conform to OSHA and ANSI standards
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Cianbro requires that all rigging equipment be sourced through one of several preferred vendors. These vendors are well aware of Cianbro's requirements, as well as the current industry standards (they will supply us with materials that meet the standards.) Contact Corporate Purchasing for current list of preferred vendors.

9 Related Documents

- 9.1 See attachments.
- 9.2 Document available on Cianbro.net or Cianbro.net>Standard Operating Procedures – on the SOP.

Boom Truck Critical Lift Plan	SD1034
Container Box Hoisting Checklist	SD1090
Manual Hoist Pre-Lift Rigging Checklist	SD1038
Pre-Lift Checklist Barge Mounted Cranes Only	SD1003
Pre-Lift Checklist for Two Cranes	SD1039
Pre-Lift Checklist Land Based Cranes Only	SD1004
Pre-Lift Checklist Procedures for Overhead Cranes/Power Hoist	SD1005
Rigging Classification Sheet	PD634
Supervisor Monthly & Daily Chain Sling Assembly Inspection	SD1066

‘Tagline Use’ Guideline

WHY DO WE USE **TAGLINES**? TO HELP CONTROL LOADS/MATERIALS SUCH AS:

- Controlling loads in windy conditions.
- To keep long materials from swinging into the crane booms.
- To keep loads/materials from swinging into power lines.
- Maneuvering loads through or around tight spaces.
- Anytime when working around traffic and pedestrians.
- When performing steel erection.
- When hoisting close to or onto scaffolds.
- When hoisting suspended personnel platforms, if appropriate.
- When a rotation of the load would be hazardous.
- When working on any site when MSHA rules apply (tag lines on all loads).

TYPES OF MATERIALS USED AS TAGLINES:

- Nonconductive line: **dry polypropylene rope only** (when used around power lines).
- **Do not use electrical extension cords, wire, air hoses or lanyards used for fall protection.**
- No loops, hooks or knots on the ends of taglines (they tend to catch on items).

LENGTH OF TAGLINES:

- Short enough so as not to get tangled on items being lifted over.
- Long enough to handle bulky/long loads from the ground (100% control).
- Long enough to control a load when landing.

SECURING TO LOADS:

- Use knots that can be easily untied.
- Can use snap hooks on end of tagline to secure to load.
- Tie to bolt holes in steel, to rigging on loads, or wrap around the loads.

HANDLING TAGLINES:

- Do not wrap the tagline around your hands, arms or body (You may find yourself going up with the load. For the reason, you cannot unwrap the line as fast as the load was being lifted.)
- May need 2- taglines to control the load
Example: Have a tagline on each end of a girder where one team member would be pulling in one direction and the second team member would guide the load in a different direction.
- May need to wrap a tagline around a fixed object to control or secure the line.

STORING TAGLINES:

- Coiled up in rigging storage area.
- Inside compartments of cranes, boom trucks and other lifting equipment.
- Send taglines with rigging.
- Store & inspect taglines as part of your rigging.

Softener Use Guidelines

All rigging operations no matter how large or small should have a softener use evaluation done; these guidelines we hope will help you in making that evaluation.

WHEN DO WE NEED TO USE SOFTENERS?

- Anytime an edge could come in contact with a sling or a load handling and control device. (Chain falls, load chains, nylon and cables slings etc.).
- Whenever there is a change that a load will shift or slide in the slings.

TIPS FOR MAKING SURE SOFTENERS ARE USED CONSISTENTLY:

- Make sure that there are enough softeners of the right material on the project.
- Make sure that the softeners are secure in place when the load is lifted.
- Ensure that the softeners are picked up and put away with the rest of the rigging materials.
- Train team members to use softeners with all rigging materials – nylon, chains and cable slings.
- Include the type and number of softeners needed in your Activity Plan.

SOME TYPES OF SOFTENERS THAT CAN BE USED

- Sliding sleeve covers that go over the end of the nylon slings.
- Velcro closure sling covers that allow it to be put on before or after the slings are in place on the load.
- SlingMax has some good softener products like CornerMax Wear Pads.
- Nylon slings can have softeners sewn in them by the manufacturer.
- Sling Protectors that have magnets that attaches them to steel for use with cable and nylon slings (Linton Rigging Gear LLC).
- Shackle Pin Pads are a product of SlingMax.
- Wood can be a very good softener for steel when using cable and chain slings.
- Fire Hose works well with nylon slings and can be cut to what ever lengths are needed and slid over the slings.
- Split round steel pipe on steel edges is a good softener.

BENEFITS OF SOFTENER USE

- Prevents accidents that could injure you or your co-workers.
- Stops damage to the slings and load.
- Softeners save **Job Costs** by not having to replace damage slings.
- It's the right thing to do.

Sorting (Pelican) Hooks Guidelines



Sorting hooks are designed to sort materials – commonly flat plates, sheet piles, straight beams and round pipes in a lay down area. Other uses include off-loading trucks and rolling structural shapes. The intent is to have the loads engaged fully into the throat of the hook. The following are guidelines for the safe use of the hooks on our project sites:

1. Know the weight of the load and the capacity of the rigging – including the hook. The hooks that we use are normally rated for 7.5 tons in the throat of the hook.
2. There is also an allowance for loading the hook further towards the tip. If the load is not engaged into the throat of the hook the load limit is reduced to 2 tons, however the load cannot be closer than 2" from the hook tip.
3. Hooks must be attached to the load in a manner that maintains a level, balanced and stable condition throughout the sequence of the lift.
4. If the load begins to bend, then stop the pick and evaluate the process further. Change the configuration if necessary.
5. Use only wire rope slings for attachment to the hook if sling contacts load.
6. If using sorting hooks with synthetic slings, add extra shackles at hooks so sling doesn't contact load.
7. The loads must be in full view of the operator at all times during the pick.
8. The load will be maintained as close to the ground as possible at all times.
9. Materials shall not be lifted over head with sorting hooks. A positive connection must be used – i.e. a latching hook, choked slings, etc. for items being lifted over head.
10. Tension must be maintained at all times during the lift so that the hooks do not disengage.
11. The sling angles shall not be greater than 45° from horizontal to maintain the allowable 7.5 ton hook capacity. At angles greater than 45° the force attempts to tip load and spread the hook. If the angle is greater than 45° then the capacity is reduced to 2 tons provided the limitations in item #2 are also met.
12. Side loading of the hooks will not be allowed.
13. Off-loading trucks with sorting hooks will be permitted.
14. Team members will not be allowed in potential pinch points during the pick.
15. Sorting hooks shall not be used for any purpose that exceeds the manufacturer's recommendations.
16. Sorting hooks shall not be used for erecting steel.
17. Sorting hooks shall not be used in choker hitch applications.

CIANBRO

Rigger Classifications

The task of rigging is an integral part of everyday work in our company. There is a wide range of skills required depending upon the complexity of the job. Starting in 2002, we distinguish the various rigging levels of abilities by breaking down our classifications in five groups: **Level 1, 2, 3, 3A and 4 Riggers** for which we issue hard hat decals. For specific designation, we also grant at the level 2 nine endorsements. The definitions below are used objectively to assign a rigging level and/or endorsements. The individual rigging classification will be reviewed yearly during the team member profile process.

New rigger classification must have been endorsed by a superintendent/site supervisor and confirmed by the regional rigging coordinator. Level 1 will be granted at this stage while level 2 on up will be submitted to regional rigging committee for final approval. To facilitate this process, we use the Rigger Classification Combo form (PD634) available under cianbro.net, resources, forms, secure forms, and Rigger Classification Combo. The new Cianbro classifications will show on team member profiles, as hard hat decals, and on electronic reports available to our managers and supervisors.

NCCCO certifications for Signalperson and rigger have been added as a requirement in May 2010. We are planning on completing our catching up with current riggers by 2012.

Level 1 Rigger

At a minimum, the team member should have taken Cianbro's current 8-hour Basic Rigger Training Class and applied this knowledge for one year of "rigging in the field". Some basic rigging work activities would require the team member to be competent in:

a. Come-along / chain fall operations	b. Crane signal ability -knowledge of crane operations (documented written and practical test)
c. Use and care of nylon/wire rope slings	d. Use and care of rigging hardware (i.e.) cable clips, shackles, sorting hooks,, and tag lines.
e. Basic knot tying	f. Rigging safety
g. Boom truck / fork lift load charts	

Level 2 Rigger

In addition to the criteria outlined in Level 1 Rigger, the team member needs two years of rigging in the field and to have demonstrated ability in:

a. Determination of weights of loads and sling tension	b. Determination of center of gravity of loads
c. Jacking/blocking operations <50 Tons	d. Sliding/rolling operations
e. Multi-crane lifts (<20T and up to 75% capacity)	f. Lift chart training
g. Work with Mobile crane, or Tower crane, or Overhead crane	h. Blind lift
i. <50 Tons at 75% capacity	j. Complete Advanced Rigger Training Class
k. Third Party Signal person and Rigger certifications	

Potential additional Endorsements for Level 2

2.1 Fab Shop Endorsement <ul style="list-style-type: none"> a. Overhead crane operations b. Proper use of chains, plate grabs and magnets c. Rigging, handling and turning over materials d. Third party overhead crane certification 	2.2 Structural Steel Erection Endorsement <ul style="list-style-type: none"> a. Building erection/demo and / or Bridge Girder erection/demo b. Miscellaneous metals
2.3 Cofferdam Construction Endorsement <ul style="list-style-type: none"> a. Use of vibratory/impact hammer b. Use of templates c. Use of sheet handling rigging equipment d. Set up and use of clam bucket e. Master rigging segment Cofferdam/Pile Driving training 	2.4 Pile Driving Endorsement <ul style="list-style-type: none"> a. Set up and operation of vibratory hammers b. Set up and operation of leads and impact hammers c. Use of templates d. One or more of the following: rigging of pipe pile, h-pile, concrete pile, wood pile e. Master rigging segment Cofferdam/Pile Driving training

<p>2.5 Marine Endorsement</p> <ul style="list-style-type: none"> a. Completed Marine Rigging Class b. Barge moving, positioning and securing c. Use and care of rigging materials in marine environment d. Securing of materials and equipment on Barges e. Small boat training 	<p>2.6 Heavy Lift on Land</p> <ul style="list-style-type: none"> a. Single crane lift greater than 50 tons up to 75% of crane capacity, or b. Multiple cranes lift >20T and up to 75% of crane capacity c. Pre lift planning <ul style="list-style-type: none"> • Load turning with 1 or 2 crane(s) • Lifting beams d. Demolition e. Heavy lift training (portion of level 3 Master) f. Total of 5 years of experience (submit 2 examples of lift plans you have worked on)
<p>2.7 Assembly/Disassembly Director</p> <ul style="list-style-type: none"> a. Single crane lifts to 100% capacity in A/D operations b. 2 crane lifts over 20 tons in A/D operations c. Minimum of 3 assembly and 3 disassembly operations documented and signed by the current A/D director. d. Pre-lift planning 	<p>2.8 Industrial Endorsement</p> <ul style="list-style-type: none"> a. Tugger operations, including set up, block placement b. Load drifting both chain fall to chain fall, hoisting equipment to chain fall (chain tension) c. Third party overhead crane certification d. Low head room rigging operations e. Placement of attachment points, beam clamps-pad eye f. Confined space as it relates to rigging g. Special rigging – Cantilever beam, etc
<p>2.9 T&D Operations Endorsement</p> <ul style="list-style-type: none"> a. Be able to calculate pole, reel weights b. Demonstrate safe methods for removal and lowering of poles appropriately c. Be able to analyze lift site for proper crane sizing and set up for fall zones, ground conditions, adjacent power lines and other hazards d. Proper set up of poles and tensioners e. Mono-pole lifts, no lattice structures f. Complete grounding training and Operator/builder training 	

Please note: At times the complexity of the lift is (high, c.o.g.,etc) is a larger concern than the crane's capacity. ALL lifts need to be reviewed that way in Level 2.

-These endorsements will be available on the Qualification Master report and in CMiC but not displayed with hard hat decals.

Level 3 Rigger

This team member would work for two years in the field (performing rigging functions) after completing all Level 2 requirements, 2.6 endorsement and two other endorsements. (i.e. team member has Level 2 – 2.6, 2.2, 2.8)

<p>Heavy rigging >50 tons</p> <ul style="list-style-type: none"> a. Crane lift b. Jack / Block c. Slide / Roll 	<p>NCCCO Certifications for Signalperson and Rigger maintained</p>
<p>Multi-crane lifts (over 20 T)</p>	<p>Master Rigging Training Class Completed</p>

Level 3A Rigger

This team member would possess the same experience and training as described in the Level 3 Rigger, but would also have stand-alone marine experience as outlined below:

Barge Set Up	Mooring Lines and Knots
Barge Moving and Operations	Marine Rigging Training Completed

Level 4 Rigger - Master Rigger

Level 1-3A riggers are considered technicians whereas a Level 4 would be a rigging supervisor. Team member would be able to manage all aspects of rigging operations on any project. The team member would need the ability to bring all of the resources together that are needed to complete any rigging task (equipment group, temporary design group, rigging procurement, crew selection, etc) The team member would have the ability to assess any rigging activity and advise on means and methods to perform the work. The team member would be qualified as a rigging resource to their region and expected to mentor potential career riggers. **This team member would be considered a “competent person/lift director” in all rigging operations including marine operations.**

Rigging Classification Process

The dynamics of rigging are broad and are ever changing. These steps, which require a minimum of five years to achieve, will require the successful team member to have a real desire to pursue this profession. Candidates will be evaluated throughout the process. *If you have any questions regarding this classification, please feel free to call the representative for your region:*

Northern New England contact Bill Dusty at (207) 329-2112
Southern New England contact *Don Smith* at (860) 286-3000
For Mid Atlantic contact *Lee Aylward* at (443) 400-8249
For Equipment contact *Mike Berry* at (207) 679-2215
For Fabrication and Coatings contact *Rick Fish* at (207) 679-2202
For Transmission and Distribution contact *Bill Moulton* at (207) 415-5248

Once a team member completes the above listed requirements of a level, s/he would be considered competent for that level and the previous ones, if any.

9.5 Appendix E

ANSI Standard B30.16-1973

16-1.2.1.2 Frequent Inspection

Items such as the following shall be inspected for damage at intervals as defined including observation during operation for any damage, which might appear between regular inspections. Deficiencies shall be carefully examined and a determination made as to whether they constitute a safety hazard.

- a. Braking mechanism for evidence of slippage under load. Daily.
- b. Load chain for wear, twists, and broken, cracked or otherwise damaged links. Daily. Check chain also for deposits of foreign material which may be carried into the hoist mechanism.
- c. Hooks for deformation, chemical damage, or cracks. Hooks damaged from chemicals, deformations or cracks or having more than 15 percent in excess of normal throat opening or more than 10 degree twist from the plane of the unbent hook, refer to 16-1.2.3.3 b.3.

Note: Any hook that is twisted or has throat opening in excess of normal indicates abuse or overloading of the unit. Other load bearing components of the hoist should be inspected for damage, daily.

16-1.2.1.3 Periodic Inspection

Complete inspection of the hoist shall be performed at intervals as generally defined in 16-1.2.1.1 b.2 depending upon its activity, severity of service, and environment, or as specifically indicated below. These inspections shall include the requirements of 16-1.2.1.2 and in addition items such as the following. Any deficiencies such as listed, shall be carefully examined and determination shall be made as to whether they constitute a safety hazard.

- a. Excessive wear of chain, load sprockets, idler sprockets or chain stretch.
- b. Hooks. dye penetrates; magnetic particle or other suitable crack detecting inspection should be performed at least once per year.
- c. Hook retaining nuts or collars and pins, welds or riveting used to secure the retaining member should be inspected.
- d. Brake Mechanism. Worn, glazed or oil contaminated friction discs, worn pawls, cams or ratchet. Corroded, stretched or broken pawl springs.
- e. Worn, cracked or distorted parts, such as: hood blocks, suspension housing, outriggers, hand chain wheels, chain attachments, clevises, yokes, suspension bolts, shafts, gears and bearings.
- f. Loose bolts, nuts or rivets.
- g. Supporting structure and trolley, if used, shall be inspected for continued ability to support the imposed loads.
- g. Warning label required by 16-1.1.1.3 for absence or illegibility.

Container Inspection for Connex Boxes

Inspection Criteria:

1. Open the container and inspect for contents if any, remove or secure prior to hoisting.
2. Determine the weight (actual or estimated) of all contents to remain secured in the container.
3. Inspect the condition of the floor, if it is rotted or full of holes container needs to be emptied prior to hoisting.
4. If outfitted with lights, secure bulbs, if shelving is installed verify it is secured from tipping.
5. Inspect the inside perimeter top and bottom (if possible) of the container looking for structural damage, cracked welds or deteriorated steel.
6. Inspect the exterior of the container looking for structural damage, cracked welds or deteriorated steel. Pay close attention to the 4 corner ISO castings. (Both bottom and top)
7. Add tare (empty) weight of the container to actual or estimated weight of contents. This is the total weight of the container to be hoisted.
8. Verify hoisting equipment has capacity and range to make the lift.
9. If using a fork lift or loader with forks use the fork pockets on the container as lifting points. If the forks do not widen out far enough for the pockets or the container is not equipped with fork pockets, the forks must extend the full width of the container.
10. If using a crane it is recommended to lift the container from the bottom 4 corners lugs. Manufactured lifting attachments are available for this application.
11. The 4 top ISO corner lugs are rated for vertical lift only if the container is loaded or an angular lift if the container is empty. (CAUTION BOTTOM LIFTING ATTACHMENTS ARE NOT COMPATIBLE WITH TOP ISO CORNERS) use shackles and a 4 leg bridle of proper length for attachment.
12. All concerns as to condition shall be brought to a supervisors attention for evaluation.

Policy Number: 009

Authorized By: Michael W. Bennett

Title: Concrete Demolition

Effective Date: 03/01/75

Page 1 of 5

1 Status

1.1 Update of existing policy, effective 03/05/15.

2 Purpose

2.1 To provide safe working conditions while performing concrete demolition activities.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 NRR: Noise Reduction Rating on your hearing protection.

4.2 PFT: Pulmonary Function Test required every three years if you need to wear respirators.

4.3 PPE: Personal Protective Equipment that may be needed to do the work required (gloves, respirators, etc.)

5 Policy

5.1 At a minimum, these established standards for concrete demolition will be followed when planning and executing the work.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 The corporate safety department is responsible for maintaining this document.

7 Concrete Demolition Index

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7.1 Hazard Identification

7.1.1 Carefully examine the job scope to identify all possible concrete related hazards. This will allow the project to be prepared with working solutions. Examples of common hazards are as follows:

- Excessive Noise Levels
- Floor Openings
- Silica Dust
- Structural Failures
- Falling Debris
- Heavy Lifting
- Compressed Air
- Repetitive Motion and Vibration Exposure
- Fall from Height
- Hazardous Substances (lead, asbestos, chemicals) from coatings, prior spills, etc.

7.1.2 Be specific with solutions to these hazards and document in the Activity Plan! A written engineering survey is required by law to guard against structural collapse and should be included in the Activity Plan. Plans need to include good communications and feedback from each team member in the crew before starting work and each day as conditions change.

7.2 Exposure Reduction

7.2.1 Less time exposed means less opportunity for injuries to occur.

7.2.2 When planning projects, reduce your dependency on the human body and high risk exposures by focusing on the use of equipment such as:

- Hydroblaster
- Hoe Ram
- Target Saw
- Concrete Crusher
- Hydraulic Rock Splitter
- Abrader
- Skidsteer Loader
- Hydraulic Chain Saw
- Diamond Wire Rope Saw
- Remote Controlled Equipment

7.2.3 Administer manpower and schedules to reduce exposure by rotating crews and by working demolition when the least number of people are in the area.

7.2.4 Be prepared to install perimeter guarding around floor openings that can appear during the demolition process. Also demolition can create many load changes to existing and temporary structures, especially with respect to work sequence. Solicit professional engineering and design consultation with the Cianbro Engineering and Design Department to help solve load problems.

7.3 Environmental Controls

- 7.3.1 Use a water spray to control dust. Reference Cianbro's Silica Safety Policy and Procedure.
- 7.3.2 Enclose the work area to minimize the impact to other activities or sensitive equipment close by and provide ventilation to exhaust away dust to a safe unoccupied area.
- 7.3.3 Install shielding or false work under elevated work areas to protect team members and equipment from falling debris. Prevent dust and debris from entering water bodies.
- 7.3.4 Select equipment that has mufflers or silencers.
- 7.3.5 Select equipment with anti-vibratory protection and/or use personal protective equipment.
- 7.3.6 Barricade and post warning signs at the work area to prevent entry from non-essential persons.
- 7.3.7 Remove debris quickly and maintain a clean work area as a priority. Remember that concrete debris is regulated in the State of Maine with a non-hazardous waste (NHW) permit and manifest. Hauling this waste over Maine roads and highways requires vehicles licensed to haul NHW.
- 7.3.8 Develop and implement a plan for spill prevention and response on the site.

7.4 Personal Protection

Identify appropriate and necessary PPE using the hazard analysis section of the activity plan and after choosing feasible engineering and administrative controls to eliminate or reduce the hazard. PPE is the last resort!

7.4.1 Hearing Protection

- Do a dB noise level survey to determine what measures are required for Hearing Conservation. Demolition projects can easily generate levels of 115 dB or more.
- Use ear protection with a Noise Reduction Rating (NRR) high enough to reduce the team member exposure below 85 dB. Cianbro requires that levels be reduced to less than 85 dB for an 8-hour day. Remember that Cianbro requires subtracting 7 dB from the NRR then dividing by 2 when calculating the amount of noise reduction a specific piece of hearing protection can provide. Refer to the Cianbro Hearing Conservation Program Policy and Procedure.
- Earmuffs when worn in addition to earplugs will add another 5 dB reduction.
- For harsh situations where the noise cannot be reduced to less than 85 dB exposure then worker exposure duration must be reduced to levels within the following chart. Noise dosimeters should be used to accurately quantify a team member's exposure.

Permissible Noise Exposure

<u>Duration Per Day Hours</u>	<u>Sound Level dBA Slow Response</u>
8	85
6	87
4	90
3	92
2	95
1 ½	97
1	100
½	105
¼ or less	110

- Team members must be trained on the proper use, care and limitations of hearing protection using the Cianbro Hearing Conservation Safety Policy and Procedure and the Project Activity Plan.

7.4.2 Respiratory Protection

- Silica, which is present in concrete dust, is known to be harmful to the lungs. Concrete dust is considered hazardous and probably requires respiratory protection if a dust cloud is visible. Feasible engineering and administrative controls must be used to keep the dust out of the air. Air sampling is the only way to verify that appropriate protection is being used. All team members must be medically approved and fit tested before a respirator can be worn. Remember that the Medical Questionnaire and Fit Test are valid for one year and the PFT for three years. Reference the Crystalline Silica Protection and the Respiratory Protection Safety Policy and Procedures.

7.4.3 Eye Protection

- Double Eye Protection is mandatory when operating or tending a demolition tool or any other powered tool.

7.4.4 Repetitive Motion

- Vibration and repetitive motion are major contributors to hand and wrist injuries as well as cumulative trauma disorders like white finger disease. These injuries can be prevented through ergonomics with the use of shock absorbing pads on tool handles, anti-vibratory gloves, substituting equipment for people, and worker rotation. Reference #001 Ergonomics-Back and Soft Tissue Safety Policy and Procedure.

7.4.5 Hand and Finger

- The use of gloves is mandatory to protect hands and we must provide a wash-up facility for team members to remove any concrete or other contaminants from the skin. Team members with sensitive skin should apply barrier cream prior to the work activity and use a moisturizer after wash-up.

7.4.6 Foot Protection

- When using equipment like a 9000 pavement breaker, the activity planning should consider team member use of metatarsal (steel toe / ankle) foot protection. Unless there is a greater hazard this added protection should be used. The project management team should evaluate and decide.

7.4.7 Personal Protective Clothing

- When engineering and administrative controls are less effective, the activity planning process should include an evaluation by the project management team for the use of coveralls or Tyvek suits. Controls need to be managed so that team members do not carry demo dust on their person to breaks, lunch or to home. Vacuum use is also a good administrative control that should be used.

7.5 Compressed Air

7.5.1 Locate the air compressor so it keeps exhaust fumes outside, noise away from workers, and insures safe refueling.

7.5.2 Train team members on operating the compressor including: starting, shutdown, moisture bleed off, and cold weather operation. Read and follow the manufacturer's recommendations.

7.5.3 Install safety check valves after each air valve and secure quick connect couplers with whip lanyards or a safety wire. Shut off air valve and bleed down the residual pressure before disconnecting any air line or air tool.

7.5.4 When working on any air tool make sure to bleed off air and disconnect from the air compressor.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 Document available on Cianbro.net>Standard Operating Procedures - SOP

Demolition Checklist	SD1075
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Policy Number: 010**Authorized By:** Michael W. Bennett**Title:** Hearing Conservation Program**Effective Date:** 01/01/75Page 1 of 11

1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 Provide guidelines for eliminating or reducing noise exposure in the work environment to prevent noise induced hearing loss in team members.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Acoustic Trauma: Refers to a temporary or permanent hearing loss due to a sudden, intense acoustic or noise event, such as an explosion.
- 4.2 Decibel (dB): A unit that measures the intensity or loudness of sound.
- 4.3 dBA: The intensity of sound measured on the A-weighted scale which is weighted to match how the human ear hears (e.g. doesn't hear low frequencies very well). OSHA requires this scale to be used for measuring employee noise exposure.
- 4.4 Noise Control Zones: Refers to identifying a zone around a noise source such as a piece of equipment where hearing protection is required inside the zone, but not outside. The zone needs to be well marked.
- 4.5 Noise Induced Hearing Loss: Hearing loss that is caused either by a one-time or repeated exposure to very loud sound(s) or sounds at various loudness levels over an extended period of time.
- 4.6 NRR (Noise Reduction Rating): Measure of the estimated attenuation capacity of a hearing protector to represent the approximate noise reduction, in dBA. This number is used to calculate the noise reduction provided by each different hearing protector using the formula contained in section 7.4.4 of this policy.
- 4.7 Overprotection: Reducing noise level exposure to lower than necessary (ie. below 70 dB) through the use of hearing protection. This is considered overprotection because it would make it hard to hear back up alarms and other important noises.
- 4.8 STS (Standard Threshold Shift) is a permanent loss in hearing sensitivity due to the destruction of sensory cells in the inner ear. It is defined as (under OSHA) an average of 10 decibels (dB) hearing shift in the 2000, 3000, and 4000 hertz frequencies. This damage can be caused by:
- Long-term exposure to noise.
 - Acoustic trauma.

- 4.9 TTS (Temporary Threshold Shift): A temporary loss in hearing sensitivity due to noise exposure. Hearing sensitivity will return to the pre-exposed level in a matter of hours or days, assuming that there is not continued exposure to excessive noise.

5 Policy

- 5.1 No Cianbro team member will work in an environment with noise levels above 85 decibels (dB) without appropriate engineering and administrative controls or PPE to reduce the exposure to below 85 dB. All Cianbro locations will comply with the requirements of this policy and the standards in 29 CFR 1910 and 1926. Compliance with this written safety policy (including section 7.5 Baseline and Periodic Team Member Audiograms) is required by the OSHA/Cianbro conciliatory agreement in place around hearing protection.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 Corporate Safety is responsible for scheduling the Hearing Van each year.
- 6.3 Each Region and Company is responsible to provide a coordinator for the van trip and a schedule for their region/company.
- 6.4 Corporate Safety is responsible for maintaining this document.

7 Hearing Conservation Program Index

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7.1 Effects of Noise

OSHA counts 10,000,000 workers exposed to a daily average of noise level over 85 decibels. At this level you have to raise your voice to be heard. 1,000,000 workers have significant hearing loss from noise exposure (many more than will ever have problems from lead toxicity, other exposures, or soft tissue injuries). This hearing loss is not inevitable; it can be prevented! Hearing Loss:

- 7.1.1 Has no visible effects, so we ignore it.
- 7.1.2 Causes slow progressive loss of communication with family and friends.
- 7.1.3 Hearing impaired people will often tell family and friends, "Don't shout! I can hear you. I just can't understand you!"
- 7.1.4 Continuous noise is the worst type; there is no time for the ear to recover.
- 7.1.5 Repetitive noises (gunfire, pile driving and jack hammering) are also very damaging. "Acoustic trauma" refers to an explosion (or other very, very loud single event).
- 7.1.6 All types of hearing loss and noise damage are decreased or prevented by appropriate hearing protection.
- 7.1.7 There is no medical treatment for noise induced hearing loss! Hearing aids are not effective for many types of hearing loss.
- 7.1.8 If you already have had hearing loss in one or both ears, it is as or more important to wear hearing protection. If you are exposed to noise at work or at home, your hearing will continue to deteriorate. Turning off or removing a hearing aid is not hearing protection and does not protect your ears from further damage.
- 7.1.9 Noise induced hearing loss typically starts in the high frequencies. First you can't hear your brakes squeak when everyone else can, then you can't hear your watch tick. Later, you begin to have trouble understanding what people say to you. This loss is permanent in many cases and is completely avoidable. Cianbro is making every effort to help you prevent this loss. Help us – wear your hearing protection correctly whether you are at work or at home and be prepared for your audiogram testing. Avoid unprotected noise exposure!

7.2 Engineering or Administrative Controls

- 7.2.1 The first step in addressing the hazard of noise exposure is planning on how to eliminate it from the work environment. This should be done during the planning stages of the activity and included as part of the activity plan. Identify engineering and administrative controls that will reduce or eliminate the noise exposure.

- 7.2.2 Engineering and administrative controls can eliminate or reduce environmental noise levels and potential team member exposure. The goal is to bring noise below 85 decibels (dB) for an average 8-hour day. Examples include:
- Using curtains/baffling on walls, ceilings or between work areas.
 - Using an alternate method or tool.
 - Keeping unnecessary people out of the area.
 - Using additional insulation in the cabs of machinery.
 - Ensuring tools and equipment are well maintained. (This eliminates unnecessary knocking, etc.).
 - Limiting team member time around noise areas to limit their exposure.
 - Moving noisy equipment like portable generators farther away or around corners.
 - Placing all noisy machinery in one area and enclosing that area.
 - Spacing out team members, if possible, in their work area (this helps decrease noise levels in a work space.)
 - Changing times of work shifts so other team members are not exposed to the noise or so our work can be done when there is less background noise.
 - Develop "noise control zones" around noisy equipment where hearing protection is required only inside the zone. This requires measuring the noise levels and a way to clearly mark the zones.
- 7.2.3 Controls should be used to eliminate the need for hearing protection. Controls may not always be sufficient for Cianbro work environments. Planning out an activity can remove or significantly reduce the potential team members and environmental noise exposure. In addition, post warning signs on equipment or in areas where noise exposures equal or exceed 85 dBA.
- 7.2.4 One thing to keep in mind is that PPE is ALWAYS the last approach for protection. We need to eliminate the hazard first, or minimize the exposure before using PPE. Once engineering and administrative controls are evaluated and implemented then the last step is PPE.
- 7.2.5 Excessive noise and the wearing of PPE create an additional hazard by making it more difficult to hear back-up alarms and other safety related noises, so always eliminate the hazard if possible. Noise exposure levels reduced to 70 dB or below are considered overprotection (See section 7.4). Also refer to section 7.4 for how to calculate the protected noise exposure.
- 7.2.6 Choose the right PPE for the conditions. There are other products available for specific situations. For example, there is hearing protectors with communication (radios) built in. They are available usually in earmuff form but also in some custom ear plugs. Identify the appropriate PPE through the hazard analysis process after identifying engineering and administrative controls.
- 7.2.7 Cianbro is running a pilot program with a device called EarFit produced by 3M. The device measures the actual noise reduction rating (NRR) for different types of 3M hearing protection as it is used by the team member. By having the hearing protection fit tested you can determine the effective noise reduction achieved by both the type of protection and how it's worn. Check with Corporate Safety for more information.

7.3 Monitoring

- 7.3.1 Projects must monitor the average noise level of their activities. Monitoring different tasks does two things. It documents the actual team member exposure and it ensures that team member hearing protection is adequate. Dosimeters and noise monitors are available from the Pittsfield Supply as a small tool rental.
- 7.3.2 To choose which type of protection is appropriate we must measure the noise level. As a rule of thumb: if you have to speak in a louder than normal voice to carry on a conversation, you are at or around the limits for hearing protection, so reduce the noise, wear hearing protection, or get your safety specialist involved to measure.

7.3.3 A noise level history of different activities (piledriving, impacting, concrete chipping, etc.) at Cianbro jobsites is on file in Corporate Safety, and is available to support project documentation of similar activities. There are additional expected noise levels from construction equipment in the table in 9.1 Appendix A. This table is from the draft ANSI Standard A10.46 Hearing Loss Prevention in Construction and Demolition Workers.

7.3.4 Listed below is a noise average for a few of those activities. It is important to conduct jobsite specific monitoring. The environment in which these tools/equipment are used in (indoors on concrete floor, inside coffer cell, etc.) can increase or decrease the noise levels. Exposure levels also are affected by the number of different tools/equipment used in an area, and the number of team members concentrated in a work area.

Equipment Description	8-Hr Avg. dBA	Required Ear Protection Factor (NRR) Not Fit Tested
Air Compressor	103 dB	33 dB plug + Ear Muffs
Generator	97 dB	31 dB
Carry Deck	78 dB	N/A
Belt Grinder	75 dB	N/A
Hand Grinder	89 dB	15 dB
Chainsaw	101 dB	37 dB or 32 dB plug + Ear Muffs
3-Pound Hammer	100 dB	35 dB or 30 dB plug + Ear Muffs

Cianbro & OSHA's Permissible Noise Exposure

Duration per day, hours	Cianbro Sound level dBA slow response	OSHA Sound level dBA slow response
8	85	90
6	87	92
4	90	95
3	92	97
2	95	100
1 ½	97	102
1	100	105
½	105	110
¼ or less	110	115

Note: At an 85 dBA exposure, Cianbro must provide a written hearing program, periodic audiometric testing, team member training, noise monitoring and adequate hearing protection.

7.4 Hearing Protection

If engineering controls cannot eliminate or reduce noise exposure to a safe level, then team members must wear adequate hearing protection. To protect you from noise exposure there are three types of protection available, earplugs, ear caps, and earmuffs. Each form of ear protection has its own advantages and disadvantages.

7.4.1 Earplugs typically have the highest NRR (noise reduction rating) value if they are properly rolled and inserted into the ear canal. Ear plugs insert much easier when you gently pull your ear back and up with your opposite hand, then gently push the ear plug in and hold until the ear plug expands.

- Earplugs are the only type of ear protection that you can add earmuffs to for added protection.
- Some people can't wear earplugs because they irritate the ear canal.
- If you don't keep your earplugs clean, you may develop ear infections.

7.4.2 Ear caps (canal caps) have a greater comfort to them. They are usually connected to a horseshoe shaped ring and they are inserted into the ear where they cover the

entrance to the ear canal. Ear caps, while being easier to use, have many disadvantages:

- Ear caps have a lower NRR.
- If the user has a narrow head they may not be enough tension to hold them in place over the ear canal, or if a head is too wide may create too much tension and be uncomfortable.
- When wearing ear caps you can't add earmuffs for added protection.

7.4.3 Earmuffs used alone as ear protection has an NRR almost as high as earplugs, and much better than ear caps.

- You don't need to put anything into your ear so they can be very comfortable.
- When you use earmuffs for noise reduction you need to make sure there is nothing between the earmuffs and you (hair, eyeglass bows, etc.).
- You need to make sure that the earmuff cushions are soft and in good repair, any damage will reduce your protection.
- Some of the disadvantages of earmuffs are that they can get warm and can irritate the ear.
- Depending on the user's head shape, narrow or wide shaped, will impact the comfort factor of the earmuffs.

7.4.4 Determining noise reduction: First, establish the noise level. If available, use the actual fit tested NRR for the hearing protector and team member. If not available, then use the NRR from the package of your selected hearing protection, and subtract a value of 7 from it and divide by 2. Subtract the number you get from your measured noise level. This OSHA recommended method takes into account that the NRR is measured in a lab and that team members often do not wear the hearing protection correctly.

Example (Not fit tested, Using NRR from package):

Noise level is 95 dB
NRR = 28
 $28 - 7 = 21$ (adjusted NRR)
 $21 \div 2 = 10.5$
 $95 - 10.5 = 84.5$ (reduced noise level exposure)

Example (Fit Tested NRR for specific hearing protector and specific team member):

Noise level is 95 dB
Actual Tested NRR = 22
 $95 - 22 = 73$ (reduced noise level exposure)

If your protected level is below 85 dB it is adequate protection, if not you can add earmuffs for an added protection of 5 dB. This is known as double ear protection.

Example (Not fit tested, Using NRR from package):

Noise level = 100 dB
NRR = 32 (use highest NRR from either plug or muff)
 $32 - 7 = 25$ (adjusted NRR)
 $25 \div 2 = 12.5$
 $100 - 12.5 = 87.5$, which is greater than 85
Add 5 for 2nd form of protection: $12.5 + 5 = 17.5$ (new adj. NRR)
 $100 - 17.5 = 82.5$ (reduced noise level exposure)

Example (Fit Tested NRR for specific hearing protector and specific team member):

Noise level is 100 dB
Actual Tested NRR = 26
 $100 - 26 = 74$ (reduced noise level exposure)
Second form of hearing protection not necessary

If this still does not bring the level down below 85 dB then other means need to be looked at, such as allowing less time of exposure (Example: 90 dB = 4 hrs, 95 dB = 2 hrs, etc.) If we need to work in noise levels that exceed safe levels based on the above calculations, contact Corporate Safety for guidance.

Note: Do not bring reduced noise level exposure below 70 dB. This is considered overprotection and would make it hard to hear back up alarms and other important noises.

- 7.4.5 With any PPE we need to keep in mind, they are only as good as, how we use them. If they are used per manufactures recommendations they will work well, if not used correctly their protection is greatly reduced. Train team members in the proper care for and insertion of their hearing protection. As the competent person on site you must also make sure the hearing protection fits.
- 7.4.6 Care and storage of ear protection is important. The most common ear protection worn is the disposable earplugs, which after their use should be thrown away in an appropriate container. If you are using canal caps or reusable earplugs, they need to be cleaned frequently to prevent ear infections. Earmuffs also need to be cleaned. When cleaning you should, follow manufactures specifications. Most recommend using a non-alcoholic wipe (a PPE wipe), then air dry. Storage should be in a clean container that will protect them from being deformed.
- 7.4.7 Overprotection - Even in noisy environments, there are sounds we want to hear clearly – warning signals and alarms, voices of co-workers, even maintenance sounds from machinery. Just as hearing protectors may not provide enough noise reduction; there are many instances where they provide too much noise reduction. While there are no U.S. standards defining overprotection, a comparable European guidance document [EN 458] recommends that attenuated noise levels [noise levels you experience while wearing hearing protectors] should be between 70 and 84 dB for ideal communication in noise. See picture below.

Noise Level after Adding Hearing Protection (dB)



Acceptable Protected Noise Level Range

Remember, hearing protection today prevents future hearing loss. It is the responsibility of all Cianbro team members, subcontractors and visitors to protect their hearing.

7.5 Baseline and Periodic Team Member Audiograms

- 7.5.1 Cianbro conducts baseline-hearing tests on all noise exposed (one day or more above 85 dBA as an 8-hr average) team members who are hired to work for Cianbro and stay long enough to be tested during the annual hearing van testing trip. We currently choose to do baselines on non-noise exposed team members who may become noise exposed in the future as well. Any team member who is missed at this time is tested at one of our occupational clinics. The coordinator who schedules the trip works with our contracted health care provider (OMC) and the safety specialists to schedule these team members.

- 7.5.2 Cianbro also conducts periodic hearing tests on all team members whose work environment during the year could expose them above the OSHA 8-hour action level of 85 dBA. Cianbro's contracted health care provider and medical director evaluates and maintains these test records or audiograms. During the annual hearing van testing trip the following groups will be tested:
- 100% of noise exposed team members (active or on temporary layoff) that have not had a baseline audiogram since their hire date.
 - All team members whose work environment during the year could expose them above the OSHA 8-hour action level of 85 dBA or above the allowable limits set forth in table D-2 of 1926.52 at least one day in the preceding twelve months.
- 7.5.3 The Cianbro hearing van trip coordinator tracks the team members to ensure anyone that is missed gets scheduled to be tested at one of our occupational clinics.
- 7.5.4 An audiogram tests your ability to hear in the practical range of human hearing – both low (speech range) and high (squeaking brake) frequencies. Audiograms can detect hearing loss early before it is permanent. This is called a TTS (Temporary Threshold Shift). Appropriate hearing protection can allow your auditory nerve and hearing conduction system a chance to heal before your test is repeated.
- 7.5.5 What are the important steps prior to audiometric testing (having an audiogram)?
- Ears need to be free of excessive wax and/or infection.
 - Don't use Q-tips except on your outer ear, they just jam wax up against your ear drums and decrease your hearing.
 - Do use warm soapy water soaks during bath or shower, with good rinsing to keep the wax soft. Wax will migrate out of the ear canal on its own.
 - Be sure to wear hearing protection at home or at work for 14 hours or more prior to your scheduled audiogram if you will be exposed to noise. This prevents threshold shifts and prevents the extra time and expense of the repeat audiogram.
 - Team members who wear a hearing aid require special testing. Notify your safety specialist who will notify Cianbro's Corporate Safety Department.
- 7.5.6 Team members with a Temporary Threshold Shift (TTS) in either ear (an average of 10 decibels (dB) hearing shift in the 2000, 3000, and 4000 hertz frequencies) on their periodic audiogram are retested. If their hearing retest agrees with the initial shift, the team member is notified of the permanent Standard Threshold Shift (STS) in writing within 21 days of determination. A note is also placed in the comment field section of the medical test available in CMiC and through the people matrix. The following items must be reviewed:
- Contents of the Hearing Conservation Safety Policy and Procedure.
 - Meaning of a standard threshold shift and how it applies to the team member.
 - Meaning of the hearing conservation work modification for hearing protection.
 - Hearing Protection PPE requirements – hearing protection required at 85 dB.
 - Check the fit of the hearing protection device in both ears for the type of hearing protection most commonly used by team member.
 - Observe whether team member inserts/wears hearing protection device properly.
- 7.5.7 In order to determine whether the confirmed STS should be recorded on the OSHA 300 log, the team members' audiograms are age-corrected. If there is still an STS, then the team member's total hearing level is checked by averaging their non age-corrected hearing level above audiometric zero at 2000, 3000, and 4000 hz in the same ear. If this average is 25 dB or higher above audiometric zero, then it must be recorded on the 300 log as an illness. Note: if the hearing loss is due to acoustical trauma (e.g. from an explosion or other instantaneous trauma) then it is recordable based on treatment and is recorded as an injury.
- 7.5.8 Projects must complete a First Report of Incident to report all confirmed (by the retest or if a retest is not done within 30 days) threshold shifts at or above Cianbro's action level of 10 decibels. The First Report should include a detailed investigation and description of the activities that may have contributed to this standard threshold shift, on and off the job. A threshold shift of 10 dB is an illness. It must be appropriately

acknowledged by all concerned and attention given to protecting that team member's hearing while he/she is at work. Team members must also be trained to recognize and deal successfully with threats to their hearing while away from work. A 10 dB shift triggers a permanent work modification for that team member.

- 7.5.9 Our Medical Director (occupational physician) evaluates all periodic audiograms to determine if there is a shift, whether the shift is work related, and whether the team member needs to be referred to a specialist.

7.6 Training and Education

7.6.1 Team members must receive annual training on Cianbro's Hearing Conservation Program. An appropriate time to hold this training is just prior to the hearing van visiting your site. The training must be documented and the training attendance sheet must be sent to your regional training coordinator so that it gets entered in CMiC. It should include the following:

- Instruction on proper selection, fitting, use and care of hearing protection.
- Explanation of the effects of noise on hearing.
- Description of the disadvantages/advantages of each type of hearing protection.
- Contents of this Safety Policy and Procedure.
- Emphasis on the importance of using wearing hearing protection both at work and at home.
- There is a training module available for your use on the resources tab which is located at www.cianbro.net

Team member hearing is a priceless item that cannot be replaced. It is important on **all** projects that we plan our work to eliminate or reduce team member and environmental noise exposure.

7.7 Recordkeeping

- 7.7.1 An accurate record of all team member exposure measurements must be retained for a minimum of two years.
- 7.7.2 All team member audiometric test records must be retained for the duration of the affected team member's employment.

7.8 Program Evaluation

7.8.1 Cianbro's medical director annually evaluates team member hearing test results as a group in order to determine the effectiveness of the hearing conservation program in Cianbro's work environment. If our incidence of Standard Threshold Shifts exceeds 5.5% of our tested population, we will reevaluate our program to identify deficiencies and modify our program accordingly.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all required materials and PPE under this policy and to provide necessary training. Hearing protection must be available to all team members exposed to an 8-hour time-weighted average of 85 decibels or more at no cost to the team member.

9 Related Documents

9.1 See attachments

9.1 Appendix A

Probable Noise Levels of Common Construction Tools
 (From ANSI A10.46 Draft Hearing Loss Prevention in Construction and Demolition Workers)
 Noise levels represent exposures at operator's ear, except where otherwise indicated.

Tool	Noise level will probably exceed...	Reference
Air compressor	90	CDC (2005)
Air gun	108	CDC (2005)
Air hammer	110	Bragdon (1971)
Air track drill	110	Eaton (2000)
Asphalt grinder	111	Greenspan et al (1995)
Backhoe	85	CDC (2005)
Belt sander	90	CDC (2005), NIOSH (2005), NZ DOSH (2002)
Bored piledriver using auger (at 15 m)	81	Hong Kong EPD (1989)
Brick saw	94	Burgess and Lai (1999)
Bulldozer	87	CDC (2005), Dobie (1993), Alfredson and May (1978)
Chipper, pneumatic	100	Hassall (1979), Olishifski (1975)
Chipping gun	96	Kerr et al (2002), CDC (2005), UW (2004)
Chopsaw	92	Kerr et al (2002), UW (2004)
Circular saw	88	UW (2004), CDC (2005), NZ DOSH (2002), NIOSH (2005), Kerr et al (2002)
Compactor	90	Utley and Miller (1985)
Compressed air gun	104	Kerr et al (2002)
Compressor (silenced) (at 7m)	70	Hong Kong EPD (1989)
Compressor (standard) (at 7m)	77	Hong Kong EPD (1989)
Concrete mixer truck at 50 ft	75	Alfredson and May (1978)
Concrete pump at 50 ft	81	Alfredson and May (1978)
Concrete saw	98	CDC (2005)
Concrete vibrator	90	CDC (2005)
Cutoff saw	98	NZ DOSH (2002), Greenspan et al (1995)
Diesel hammer piledriver on concrete pile (at 15m)	95	Hong Kong EPD (1989)
Diesel hammer piledriver on steel pile (at 15m)	99	Hong Kong EPD (1989)
Double scraper	92	Dobie (1993)
Drill	87	NZ DOSH (2002), CDC (2005)
Drop hammer piledriver on concrete pile (at 15m)	83	Hong Kong EPD (1989)
Drop hammer piledriver on steel pile (at 15m)	93	Hong Kong EPD (1989)
Dump truck	78	Utley and Miller (1985)
Electric grinder	98	NZ DOSH (2002)
Excavator	80	Greenspan et al (1995), Utley and Miller (1985)
Forklift	93	Utley and Miller (1985)
Framing saw	82	NIOSH (2005)
Front end loader	90	Burgess and Lai (1999), Utley and Miller (1985)
Generator at 50 ft	72	Alfredson and May (1978)
Grader/scraper	107	Greenspan et al (1995)
Grinder	87	UW (2004), NIOSH (2005)
Hammer	85	CDC (2005), NZ DOSH

Tool	Noise level will probably exceed...	Reference
Hammer	89	(2002) UW (2004)
Jackhammer	102	CDC (2005), Ren (1999), Alfredson and May (1978)
Jigsaw	91	NZ DOSH (2002), Kerr et al (2002)
Aerial lift	84	CDC (2005)
Mechanical tamper	90	CDC (2005), Greenspan et al (1995)
Mechanical tamper at 50 ft	90	Alfredson and May (1978)
Mobile crane	78	Utley and Miller (1985)
Motorized wheel barrow	86	CDC (2005)
Nailgun	97	NZ DOSH (2002)
Paver at 50 ft	86	Alfredson and May (1978)
Piledriver at 50 ft	95	Alfredson and May (1978)
Portaband	83	Ren (1999)
Portable welder	84	CDC (2005)
Powder actuated tool	89	NZ DOSH (2002), UW (2004), Kerr et al (2002)
Reciprocating saw	86	NIOSH (2005)
Road grader	95	Dobie (1993)
Rotohammer	84	NZ DOSH (2002), CDC (2005), UW (2004), Kerr et al (2002)
Router	90	NZ DOSH (2002), Kerr et al (2002)
Scraper	117	Dobie (1993)
Scraper at 50 ft	80	Alfredson and May (1978)
Screw gun	86	UW (2004), Kerr et al (2002)
Steam roller	85	Utley and Miller (1985)
Steam roller	84	Kerr et al (2002)
Stud welder	101	CDC (2005)
Vibratory piledriver on steel pile (at 15m)	85	Hong Kong EPD (1989)
Welding equipment	92	UW (2004)

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1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 To eliminate fall hazards in the work place and to make **tie off the last resort**.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Anchorage: A secure point of attachment for lifelines, lanyards and or deceleration devices.
- 4.2 Controlled Access Zone (CAZ): It is an area in which certain work can take place without the use of a guard rail systems, net system or personal fall arrest systems and access to the zone is controlled.
- 4.3 Free Fall: The act of falling before the fall arrest system begins to apply force to the fall arrest system.
- 4.4 Free Fall Distance: The vertical distance that the fall arrest attachment point of the body harness falls from the beginning of the fall to the point that force is applied to the fall arrest system. This does not include the deceleration distance, and the elongation to lanyard and lifeline.
- 4.5 Leading Edge: Any edge of a floor, roof, deck or formwork for a floor, or other walking working surface. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.
- 4.5.1 Hole / Opening (Tripping or Dropping Items Through) – Any opening 2" or greater in its least dimension through which a team member could drop something or on which a team member could trip and fall to the same level.
- 4.5.2 Hole / Opening (Fall Through) – Any opening 12" or greater in its least dimension through which a team member could fall to a lower level 6' below (4' for general industry).
- 4.6 Walking Working Surface: Means any surface, vertical or horizontal on which team members walk or work, including but not limited to floors, roofs, ramps, bridges, runways, formwork, concrete reinforcing steel and water.
- 4.7 Warning Line: Is a barrier erected to warn team members that they are approaching the unprotected edge of the working surface. The area inside of the barrier does not require fall protection or fall arrest systems to perform work.

5 Policy

- 5.1 The use of fall protection at the site shall follow or exceed Subpart M 1926.500 and Cianbro's 100% Fall Protection Policy. Whenever our client's fall protection policy is more stringent than Cianbro's, the client's rules prevail.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of the Fall Protection Program under this policy.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.
- 6.3 Corporate Safety is responsible for maintaining this document.

7 Fall Protection Program Index

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7.1 Planning

7.1.1 The thought process required in planning for elevated work hazards (work at any height above adjacent surface) consists of three fundamental considerations. In order of priority they are:

- A. Eliminate – the HAZARD. Make it impossible for someone to fall. For example: prefabricate or build on the ground.
- B. Control - the HAZARD. Control the work environment so that people cannot fall using engineering or administrative controls. For example: build guardrails, handrails, use specialty equipment – aerial lifts, stairways, scaffolding, etc. or design safety into the construction process (pre-drilled holes for life line systems for steel erection).
- C. Protect – YOURSELVES from the HAZARD. Use personal protective equipment. For example:
 - Tie off, using a full body harness with shock absorbing lanyards.
 - Fall arrester blocks, lifelines, etc.

Tie off is the LAST resort – you have to fall before you can use it. Our goal is to ELIMINATE falls.

7.1.2 Before any elevated work is begun in Cianbro, the project supervisor is responsible to:

- Plan the Work – Communicate to and obtain feedback from the crew performing the work on identification of hazards, corrective action and retrieval method required.
- Develop a Written Plan for Elevated Work Activities. (This can be incorporated into your regular activity plan). Send this plan to the Safety Department immediately and update at least every three weeks. Share the final plan with the crew performing the work. The plan must include provisions for rescue in the event of a fall.
- Activity plans must detail specific anchorage points, which are clearly adequate to support personal tie off. Such things as electrical conduit, wood guardrails, bolts, 3/8 inch all-thread rod, hand rail stations, welded pipe < 2 inches, cable tray slats, threaded rod suspended with malleable iron c-clamp attachment, fiberglass grating, hollow aluminum ladder rungs, etc. are not adequate anchorage points.

7.2 Cianbro Fall Protection Policy

7.2.1 Unprotected sides or edges of walking/working areas six feet or more above a lower level (see note below) shall have team member protection from falling by the use of guard rails, safety nets or personal fall arrest systems. This is Cianbro's 100% fall protection policy and if tie off is the fall protection method chosen, then double shock absorbing lanyards and body harnesses shall be utilized where required in order to maintain 100% tie off. (Use of body belts is prohibited). 100% tie-off means that at least

one lanyard is hooked to the anchorage point at all times (see section 7.2.2 for acceptable lanyards). The use of positioning systems **does not** take the place of requiring a full body harness and lanyards. Use for positioning only.

Note: According to OSHA, lower levels means those areas or surfaces to which a team member can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof. Notice that this includes mud and any other surface.

Cianbro's disciplinary procedures appear to become effective only when team members are working six feet or more above a lower level. However, in particularly hazardous situations where serious injury could result from a fall of less than six feet, the fall protection policy with associated disciplinary action will be strictly enforced as if it were a fall exposure of six feet or more. We also strongly encourage lowering the fall protection six-foot criteria for job wide or specific situations whenever there is any doubt about the possibility of serious injury resulting from a fall of 0-6 feet. Please remember – our goal is to eliminate all fall hazards.

Note: Excavations not readily seen because of plant growth or other visual barrier, wells, pits, shafts and similar excavations six feet or more in depth shall be protected by guard rails, fences, barricades or covers.

- Work under the OSHA marine standards (1915, 1917, 1918) requires fall protection at 5'.
- Work under the OSHA general industry standard (1910) requires fall protection at 4'.

7.2.2 Fall Protection Implementation

- A. Fall Protection Training shall be conducted by a competent person annually for all Cianbro team members required to work at elevated heights >6 feet and prior to each job site specific activity involving fall hazards, working at elevated heights >6 feet.
- B. Annual fall protection training shall be conducted by a competent person for all Cianbro team members required to work at elevated heights >6 feet addressing / covering the following at a minimum:
 - The most common fall hazards found in the work area: plus any specific ones that could be expected to encounter.
 - The use, proper installation, and operation of guardrail systems, personal fall arrest systems, safety net systems (if applicable, since Cianbro rarely uses nets), warning line systems, safety monitoring systems (Cianbro does not allow the use of safety monitoring systems), controlled access zones, horizontal life line systems (rat lines) and other types of protection systems to be used.
 - The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.
 - The limitations, use, care and storage of fall protection systems including personal protection equipment, like full body harnesses and lanyards.
 - The role and responsibilities of team members to follow and comply with fall protection plans.
- C. Job site specific activity training shall be conducted by a competent person addressing / covering the following at a minimum:
 - The nature of fall hazards in the work area.
 - Solutions to those fall hazards identified.
 - Correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems/PPE to be used.
 - Correct method for use and operation of personal and other fall arrest systems including positioning systems if being used.

- The limitations of mechanical and fall protection systems.
- The role and responsibilities of each team member to comply with fall protection plans.
- Retraining is required when there are changes in the work place or changes in the types of fall protection systems / equipment to be used render previous training obsolete.
- Retraining is required when inadequacies in an affected team member's knowledge or use of fall protection systems or equipment indicates that the team member has not retained the requisite understanding or skill.

D. Certification of Training

- A written certification record must be maintained showing the latest annual training for team member. The record must include; team member name, date of training, and signature of the trainer.
- Job specific activity plans must be completed for all activities involving elevated work (>6 feet).
- Any retraining that may be necessary must also be documented.
- Annual training documents must be sent to the Corporate Organizational Development Department.

Please remember that no fall protection device can substitute for good fall prevention.

- E. Some basic devices utilized as part of the Cianbro fall protection policy are shock absorbing lanyards with double locking snaps, full body harnesses, fall arrester blocks, cable grab devices, life lines (horizontal and vertical) and aerial lifts. These, and all other fall protection devices, must meet any applicable ANSI, ASTM, and/or OSHA requirements.

Note: Fall protection/prevention components (i.e. harnesses, lanyards, fall blocks, anchor straps, etc.) shall not be used for anything other than fall protection.

- F. Shock Absorbing Lanyards are the only acceptable lanyard type. They may be constructed from nylon webbing, rope or steel cable as long as a stitched or block type energy-absorbing device is incorporated. Double locking snaps are required to prevent "roll-out" of line from snap. Knotting or tying lanyards to shorten is not permitted. Different length (1 foot to 6 foot) or adjustable lanyards are available from the manufacturer.
- G. Due to the Cianbro 100% fall protection policy, if tie off is the fall protection method chosen, the double lanyards shall be utilized where required in order to have 100% tie off. Because of the potential for roll out of the snaphooks, manufacturers do not allow two snaphooks to be attached to the same D-ring. In order to provide 100% tie off, twin leg lanyards must be used. A single leg lanyard will only be allowed in situations where you do not need a second lanyard leg to maintain 100% tie off.
- H. Sometimes a fall block also needs to be attached to the harness. A fall block can never be hooked directly to the snaphook of a lanyard.
- Use a twin leg lanyard that also has an integral extension and D-ring included in order to hook the fall block.
 - Remove the twin leg lanyard and just hook the fall block directly to the D-ring or to a D-ring extension.
 - Add a loop attached D-ring extension to the back D-ring with the twin leg lanyard if the manufacturer allows. (Note: the new ANSI standard recommends against this practice)
 - Miller allows this practice but also provides another solution called an O-ring extension that is available with any of their lanyards including twin leg lanyards. The O-ring is actually part of the lanyard itself.



- SafeWaze does not allow a loop attachment and a snaphook on the same D-ring. They make a double D-ring loop product that attaches to the back D-ring of your harness providing two attachment points. You must still limit your freefall to 6' or less and if you attach a 6' lanyard to this then you are limited in where you can tie off the lanyard.



- DBI-SALA does not allow this unless you have their double bar D-ring on your harness and you attach the extension to the extra bar or purchase the harness with a D-ring extension already attached to the extra bar on the D-ring.



- Ultra-Safe the new harnesses that Cianbro supplies recommends that you use double Y lanyards with a D Ring extension or remove the lanyards from the D Ring.
- For any other brand of fall protection, check with the manufacturer.

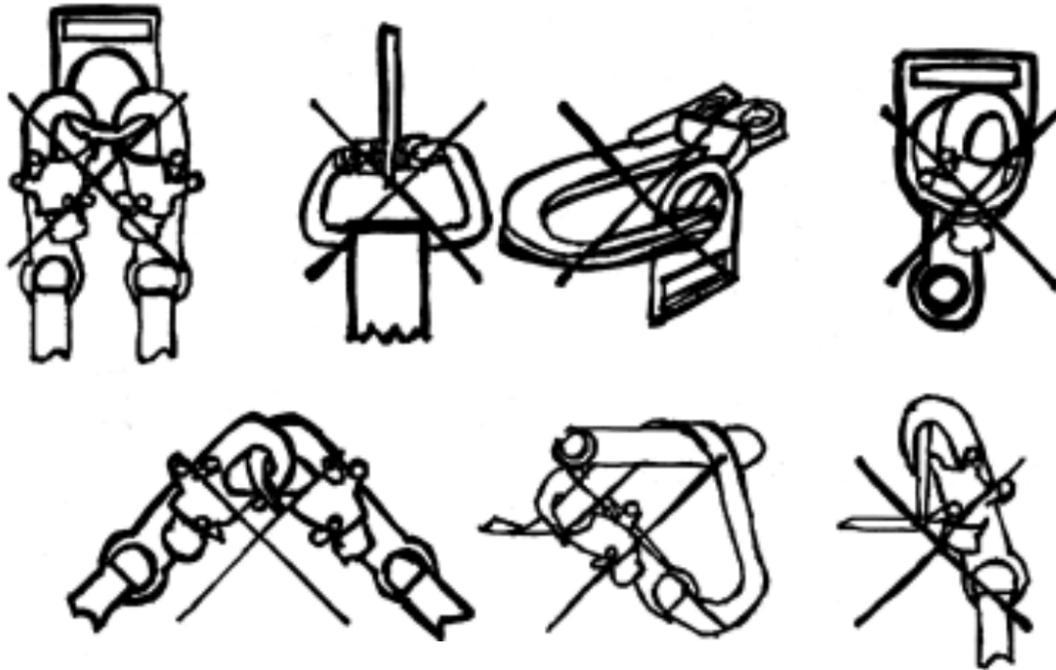
Lanyards must be utilized such that the maximum fall that could occur is less than six feet. This means that a six foot lanyard must be anchored (or hooked off) at shoulder height or higher (since D-Ring hook point is at shoulder height). Lanyards are typically rated for use by a person 310 lbs or smaller. They are also designed for a 6' freefall. If circumstances require that the tie off point be at your feet, then you need to use a lanyard rated for at least an 11' freefall in order to ensure that the arresting force on the team member remains less than 1800 lbs and that the lanyard won't fail. ***In no case may a rebar hook (large hook) lanyard be used to tie off below your D-ring height because of the likelihood of the load being applied to the gate of the hook in a fall situation unless the hook meets Section 3.2.1.4 of the updated ANSI standard Z359.1 2007 which requires the gate to be rated at 3600 lbs. Regardless of which standard the hook meets, it must be used so the load does not come against the gate.*** The Safe Approach double Y lanyards with the large rebar hooks that are supplied by Cianbro are rated at 3600lbs and are designed so that you can tie off at your feet if necessary. Make sure you have sufficient clear area below you, so you would not come in contact with a lower obstruction if you fell. This especially includes the use of beamers. Refer to Clear Area section of this policy (page 8) for more information.

Conversely, if anchored at the waist (such as in an aerial lift) then a shorter, say four-foot lanyard or retractable lanyard should be used to keep the fall less than six feet. Never anchor lanyards below your waist if there is any other possible option. Keep in mind that the lanyard in an aerial lift is supposed to keep you in the basket, not to catch you when you fall.

A lanyard should never be wrapped around an object, such as a pipe or beam, and then clipped back to the lanyard to tie off (unless it is specifically designed for this by the manufacturer). Also, one lanyard shall never be hooked into another lanyard to extend the length of your line.

In both of these instances, it is against the recommended manufacturer's usage of the lanyard. The proper method is to use a choker or a "cross-arm strap" on the pipe or beam, and then clip your lanyard into the strap. Personal fall prevention systems used in hoist areas shall be rigid to allow movement of team members only as far as the edge of walking/working surfaces. **Never attach lanyard snap-hook to another snap-hook (like lanyard snap-hook to a fall block snap-hook).** Use manufacturer's recommended connector ring made of dropped-forge pressed form steel or equivalent material capable of supporting 5,000 pounds with a minimum tensile strength of 5,000 pounds.

Prohibited Snaphook Attachments



Beware of lanyards used around cutting, welding or other flame producing operations. Steel cable lanyards with shock absorbers are manufactured for this hazard.

- Full Body Harnesses are the only acceptable forms of personal protection. Safety belts are not acceptable and must be discarded. Always attach your lanyard to the D-ring between your shoulder blades. All other D-rings are prohibited for fall protection and are intended only for lanyard stowing, working adjacent to vertical surfaces, positioning or retrieval. Improper attachment to harness D-rings may result in serious injury.
- Fall Protection Harnesses and Shock Absorbers When the Hazard of Arc Flash Exists. All team members are required to be trained in and follow Cianbro's Flash Protection Policy (refer to Cianbro's Electrical Safety & Flash Protection Policy). In addition to the requirements contained in that policy arc rated full body harnesses and shock absorbers must be used when working at heights with potential exposure to arc flash. First, non-arc rated fall protection equipment could catch fire or burn through resulting in a fall. Second, harnesses that melt, drip, or continue to burn can cause additional injury to team members. Though NFPA 70E does not address fall protection equipment, the ASTM F887-04 Arc Flash Standard provides minimum performance criteria for arc resistance of harnesses and shock absorbers for workers who may be exposed to thermal hazards from momentary electric arcs or flame.
- Fall Blocks are intended for vertical work as in climbing up and down. They may be used horizontally for work in two situations. First, if attached to a horizontal lifeline so that the fall block is always free to reposition directly over the harness D-ring of the worker below. If the block is not positioned directly over the point of operation there is a swing fall hazard from the "pendulum effect" - of being out of plumb. A swing fall can produce nearly the same energy as a vertical fall through the same distance. Therefore, it is critical that team members not move a distance of more than five feet horizontally from directly under the anchorage point. (This is regardless of the manufacturer's

allowed angle of operation for the retraction mechanism). If greater horizontal movement is required, then you need to be attached to a horizontal lifeline.

The second situation involves use of a fall block on roofs or other horizontal surfaces. This use is allowed as long as the manufacturer allows it. Spider, Miller and DBI/SALA all allow this practice, however DBI/SALA has specific requirements. In any case, don't use if the edge of the horizontal surface can cut through the cable or strap during a fall. Also, watch swing fall hazards and ensure team members are trained in how to use the fall blocks properly.

- Rope/Cable Grab Devices are utilized exclusively for vertical work such as climbing or while on suspended scaffolds, also on roofs. These are not to be used on horizontal lifelines. Lanyards must be shorter than six feet (generally four feet or less) when using grab-type devices. This ensures that a fall of more than six feet cannot occur. Beware of grab-type devices that require a free hand to slide the device along. These are dangerous and not acceptable. An acceptable grab device will slide along freely with the lanyard until a fall occurs. Make sure to use the correct size grab device for the lifeline size.
- Vertical Lifelines (droplines) are minimum $\frac{3}{4}$ inch nominal diameter synthetic rope with nominal breaking strength of 5,400 pounds. They are used to safeguard a team member performing vertical work with the anchorage point being directly above the point of operation. If steel cable is utilized it must be at least $\frac{3}{8}$ inch nominal diameter and have a breaking strength of at least 5,400 pounds.
- Horizontal Lifelines shall be a minimum of $\frac{1}{2}$ inch EIPS (extra-improved plow steel) cable. Lifelines shall be anchored such that each anchorage point will withstand the simultaneous fall impact of 5000 pounds per team member attached or if engineered designed as part of a complete fall arrest system which maintains a safety factor of at least two. Lifelines shall not have more than two team members tied off to them simultaneously between two anchorage points unless there are intermediate support points, in which case there shall be no more than two team members attached simultaneously between any two intermediate support point's Horizontal lifelines shall not exceed a maximum length of 150 feet without intermediate support points. The perimeter guard post specification shall be an acceptable type of intermediate support. Normally intermediate support points for steel cable lifelines are every 20 feet. Horizontal lifelines cannot be pulled completely tight. The tighter the line is, the less capacity it has. This is the same as with rigging. The more you reduce the angle with the load, the less capacity the slings have. There needs to be at least 1 $\frac{1}{2}$ " of sag for every 10' of horizontal lifeline between support points (per the Cianbro temporary design group). Consult an engineer if you have questions about your specific application.
- Clear Area: When selecting a tie off method, you must ensure there is sufficient clear area below so that you would not come in contact with a lower obstruction if you fell. In the case of a 6' shock absorbing lanyard, you must include 6' lanyard length, 3.5' for shock absorber deployment, approximately 5' for the height of your D-ring, one foot for the flex in your harness and a safety factor. Using a minimum safety factor of 2', that adds up to a clear distance of at least 17'-6" (and some manufacturers recommend more) without including any sag in a rat line. If you do not have that clear distance available below the tie off point, then choose a different tie off method such as a shorter lanyard or a retractable lanyard or a different method of fall protection.
- Anchorage Points must be capable of supporting at least 5,000 pounds per team member attached or if designed as part of a complete fall arrest system

which maintains a safety factor of at least two. Connectors used for fall arrest shall be drop forged pressed or formed steel or equivalent material with smooth / corrosion resistant finish. D-rings and snap hooks shall be proof tested to a tensile load of 3,600 pounds and have a minimum tensile strength of 5,000 pounds. Note: Tie off correctly! Do not wrap lanyard around an anchorage point and hook back into lanyard, unless the lanyard is designed to be used in that way.

Tie Off Do's	Tie Off Do Not's
<ul style="list-style-type: none"> • Structural members, beams, pad eyes. • Commercially engineered products beam clamps, horizontal lifelines, bolt hole anchors, etc. • Pre-plan to limit field decisions and eliminate exposure. • When in doubt test it! • Qualified person can evaluate using max arresting force and two times safety factor. • Must be independent from work surface. 	<ul style="list-style-type: none"> • Non-structural items. • Ladders, railings, c-clamps. • Corroded structural items. • Rat lines used for railings. • Swing staging or hanging platforms. • Non-secured scaffolds. • Cross arm straps around sharp objects.

- Fall Restraint means tying off so that a team member can do their work but is physically unable to reach the fall hazard itself. This is a better option than fall arrest because it eliminates the possibility of a fall and the stress on your body in the case of a fall. The anchorage point for fall restraint has to be able to support 3000 lbs.
- Aerial (Boom-Supporting) and Platform (Scissor) Lifts should be utilized wherever and whenever they can minimize fall hazards to team members without creating other hazards as a result of use. Lift operators must be Cianbro or manufacturer trained and certified. Operators shall be assigned to and responsible for documented safety checks on each lift before start of work on each shift. Lifts are designed for personnel and not intended to be used to hoist materials except for personal tools. Only those essential materials and tools required to perform the work from the lift can be in the basket and must fit completely inside the basket. Lifts must not exceed manufacturing rated load limits – know the range and capacity of your lift. Work must be accomplished by standing firmly on the platform floor.

100% fall protection applies to working in lifts. Team members must tie off immediately upon entering the basket.

Tie off at manufacturers' tie off point (when ordering machines for the project specify that they must be equipped with tie off points in the basket). Six-foot lanyards may be too long. Use a maximum four-foot length lanyard in lifts, unless conditions are too restrictive and cause a safety concern. Falls must be limited to six feet.

When planning maritime work activities, special consideration must be given to the barge and lift positioning to limit listing during operations. Before starting a work activity, the lift must be securely tied down to the barge using the tiedown eyes provided in the frame slabs in order to prevent movement.

Note: Refer to Cianbro's Safety Policy and Procedure "Boom-Supported Elevating Work Platforms (Aerial Lifts)" for additional information on aerial lift operations.

- 7.2.3 Perimeter Guarding shall meet standard handrail requirements with a top rail, mid rail and a four-inch minimum height toe board. Guard rail (hand) surfaces shall be smooth to protect against punctures, lacerations and snagging of clothing. All rail post spacing shall be a maximum of eight feet. Rails shall consist of 2" x 4" wood, 2" x 2" 3/8" steel angle, 1 1/2" diameter steel pipe or equal structural shape with similar bending strength, 1/2" diameter EIPS cable may also be used if installed with sufficient tightness and post spacing to withstand a 200 pound lateral load with less than three inches resulting deflection. Wire rope used for top rails must be flagged every six feet with high visibility material. All posts shall be anchored to withstand a 200 pound load applied any direction at the top with minimal resulting deflection. Mid-rail, screens, mesh, intermediate vertical members and solid panels shall be capable of withstanding 150 pounds of force. Toe boards must be capable of withstanding a force of at least 50 pounds. Refer to OSHA standard 1926.500 for additional information on other minimum requirements.

Perimeter guarding is required anywhere there is a drop in a floor or a deck of six feet or more. If cable guarding is used then tie off to the cable is prohibited, unless it meets requirements of the horizontal lifeline specification. No materials or equipment except masonry and mortar shall be stored within four feet of a working edge.

- 7.2.4 Safety nets are to be considered last! If nets are necessary, contact the safety department for specific requirements covered under 1926.502(c). Before utilizing safety nets on a Cianbro project (including subcontract work), the project manager must submit a detailed written plan documenting net attachment devices, interferences/fall hazards, installation procedure, daily inspection procedure and fall prevention or tie off method (to prevent falls into the net) for approval to the VP of HR, Health, Safety & Environmental. Work may start only upon these approvals.

Note: Debris nets are not safety nets. Debris nets are used to catch materials (not personnel) that might drop. They are one of the methods that are encouraged to be used whenever necessary to prevent materials from falling to a lower level.

- 7.2.5 Ladders should not be used when stairways, ramps or aerial lifts are feasible and shall only be used for the purpose for which they were designed. All ladders must be inspected before use:

- Inspect ladders for cracks and splits.
- Ensure there are no bends/breaks and see that steps or rungs are tight and secure.
- Confirm that all hardware and fittings are properly and securely attached.
- Test movable parts to see that they operate without binding or without too much free play and make sure surfaces are free from grease, oil, or other slippery materials.

Imperfect or defective ladders shall not be used (metal ladders are prohibited).

Note: Job made wooden ladders are allowed as long as they meet the requirements of 1926.1053 including being able to support four times the intended load. Job made ladders must be constructed so that the horizontal rungs are recessed into the side rails or the spaces between the rungs on the side rails are filled with a spacer block.

When use of a ladder is essential, team members must be 100% tied off when working on the ladder, over six feet unless they are climbing or descending facing the ladder with both hands free to securely grip the ladder rungs. Team members climbing or descending from ladders may stop at any time while on the ladder for a short period of time so long as no work is going on and at least three points of contact is being made while stopped. Ensure tie off is above the work area to an acceptable anchorage point and consider using, fall block, retractable lanyard or a shorter lanyards (four feet), if

necessary, so that no fall would be greater than six feet. Ensure fall will not result in hitting the floor/lower levels.

Under no condition shall anyone free-climb to gain access to upper and lower levels unless they are 100% tied off to acceptable anchorage points or using an OSHA approved conventional system like a ladder. Free climbing must be considered as a last resort only when conventional systems (i.e. ladders, stair towers, aerial lifts, etc.) cannot be used.

Aluminum ladders are not allowed to reduce the chance of contact with power lines.

Ladders must be used at the proper angle from a vertical surface of one foot horizontally for each four feet vertically on a stable base with feet properly in place. Ladders cannot be used at any other angle. Non-skid pads should be used when working on smooth surfaces. Ladder side rails must extend 36" above the landing. If team members stepping onto the landing must let go of the ladder with either hand and there is no handrail to immediately grasp, then team members must also be 100% tied off when using this type ladder. Ladders must be secured at the top or secured or held in place at the bottom until the top can be secured.

Stepladders must be used only in the fully open position.

7.2.6 Crane Suspended Personnel Lifts (Manbaskets) are **not** to be used on any Cianbro project except as the last resort as approved by the Safety Director. See Safety Policy and Procedure entitled "Use of Crane Suspended Personnel Baskets for a listing of all procedures, inspections and approvals required prior to use.

7.2.7 Working Over or Near Water where a drowning hazard exists, team members shall be provided with personal flotation protection consisting of U.S. Coast Guard approved life jackets or work vests to be worn zipped up or securely fastened as designed. If 100% tie off or other complete fall protection measures are in place, lifejackets are not required (however if you are climbing ladders with a potential to fall in the water, then either a lifejacket must be used or tie off required while climbing the ladder). **Remember, even if you are below six feet and over water, you will need a lifejacket or remain tied off.** Lifejackets are still required on barges regardless of whether you are tied off or not. If a lifejacket is used, wear it so that tool belts and other heavy articles can be removed without sacrificing the buoyancy of the flotation device!

Ring Buoys are required with 90 feet of line available for emergency rescue and stationed less than 200 feet apart along the work area.

At least one lifesaving skiff shall be immediately available and operational for emergency rescue situations at specific locations where team members are working over or near water. An effective communication system must be in place before any emergency rescue operation of this type can be successful. In addition, there will be a ladder available on each floating vessel or dock on which work is being performed. The ladder shall be long enough to assist team members who have fallen into the water.

7.2.8 Bridge Decks

A. Many new bridge designs today call for parapet barriers along each side of the bridge deck. These barriers normally are 32 to 36 inches in height with no railing extending higher, nor do they offer a practical way to increase the height to 42 inches. Cianbro has in the past added rail systems to the top of these barriers, which is sufficient in meeting the 200 # force requirements. However, we feel that a safe alternative to the 42 inch height would be to:

- Ensure a competent person develops a job specific fall protection activity plan that clearly addresses all hazards/solutions and administrative/engineering controls.
 - A standard warning line system would be placed six feet from each parapet positioned along the bridge deck side towards the bridge deck centerline in all walking and working areas. 100% fall protection/prevention would be required between the parapet and the six-foot warning line.
 - Training would be provided by a competent person to anyone requiring access to these areas under this condition.
- B. Also, there may be periods of construction work prior to the installation of the permanent parapet barriers or handrail system when fall protection/prevention measures are required along the sides of the bridge deck. Cianbro has designed and engineered a fall prevention system (guard rail system) and we also have purchased an engineered horizontal lifeline system made by Spider and Safespan to 100% tie off. In this specific work sequence there is a period of time when a transition from 100% tie off to a guard rail system occurs. In these areas, the following minimum safety measures must be provided.
- Ensure a competent person develop a job specific written fall protection/prevention activity plan clearly addressing all hazards/solutions and administrative/engineering controls.
 - Utilizing 100% fall protection, install post and cable guard rail system using ½” EIPS cable for 42” hand rail and 22” mid rail along the sides of the bridge deck in walking and working areas.
 - Install toe board in working areas only where exposure to others below exists or barricading below is not feasible.
 - Standard warning line systems may be used instead of handrail for short durations (But must be placed 10’ back from the edge if equipment is used on the bridge deck).
 - Once handrail system or warning line system is in place and inspected by a competent person, 100% fall protection (body harness/lanyards) will not be required in these work areas.
 - Training must be provided by a competent person to anyone requiring access to these areas under this condition.
- C. Over Hanging Bracketed Areas Walkways - When installing overhang bracketed walkways along the outside edge of bridge decks, ensure that the guard rail system extends above the finished deck or sidewalk elevation by at least 42”.

Dock/Piers/Barges (work areas) - There are many situations working in construction work areas on piers, docks and barges where the fall distance to the water greater than six feet. In particular, most material barges we use in an empty state have approximately 8-9 feet of freeboard to the water surface from the barge deck. In these work areas, the following minimum safety measures must be provided:

- Ensure a competent person develop a job specific fall protection/prevention activity plan addressing hazards/solutions and appropriate engineering/administrative controls.
- Workers must be in compliance with 1926.106 wearing appropriate life jackets, have deployed roped life rings and an immediately available rescue boat.
- When the fall distance is >6 feet to the water or to a solid lower level, a control access zone (CAZ) would be established utilizing a warning line system six feet or more in from the pier/dock barge edge delineating the work area. Any activity outside of the work area (in the CAZ) would require 100% fall protection/prevention measures.
- Other fall protection methods can be used in place of CAZs.

- Training must be provided by a competent person to anyone requiring access to these areas under this condition.
- D. Dock/Piers/Bridge Decks (access walkways) It is not uncommon for most private and public docks/piers or bridge decks to not have permanently installed railings that meet OSHA's standards for a guard rail system. The minimum following actions must be taken for situations where workers need to access docks/piers to get to their working areas:
- Ensure a competent person develop a job specific fall protection/prevention activity plan addressing hazards/solutions and appropriate engineering/administrative controls.
 - Workers must be in compliance with 1926.106 wearing appropriate life jackets, have deployed roped life rings and immediately available a rescue boat.
 - When the fall distance is >6 feet to the water or to a solid lower level, install warning line system 15 feet from the walk way sides towards the dock/pier center, or provide complete guard rail system or require 100% fall protection.
 - Training must be provided by a competent person to anyone requiring access to these areas under this condition.

7.2.9 Open-Sided Floors

- A. During the construction and demolition of floors there are periods when the guarding along the floor edge is removed or has not been installed. In these work areas, the minimum following safety measures must be taken.
- Ensure a competent person develops a job specific fall protection/prevention activity plan addressing hazards/solutions and installing appropriate engineering/administrative controls.
 - When the fall distance is >6 feet to a lower level, a control access zone (CAZ) could be established utilizing a warning line system at least 6 feet from the open floor side delineating the work area. Any activities outside of the work area in the CAZ would require 100% fall protection/prevention measures.
 - Training would be provided by a competent person to anyone requiring access to these areas under this condition.

7.2.10 Roofing Work also requires the use of basic conventional fall protection/prevention systems as the primary options, however, the following are also acceptable methods for use as a last resort: Note: Section 1926.501(b) defines "roofing work" as: "the hoisting, storage, application, and removal of roofing materials and equipment, including related insulation, sheet metal and vapor barrier work, but not including the construction of the roof deck.")

- Warning line systems when used for roofing work shall be erected at least six feet from the roof edge and ten feet when mechanical equipment is being used. Lines shall be flagged every six feet with high visibility material and have a minimum tensile strength of 500 pounds.
- Materials and equipment shall not be stored within six feet of a roof edge unless guardrails are erected at the edge.
- Controlled Access Zones (CAZ) and WLS are OSHA approved last resort methods to accomplish roof work when conventional fall protection/prevention systems are not possible or create more of a hazard. The Safety Monitoring System (SMS) method is not acceptable to Cianbro and could only be used with the approval of the safety director and applicable regional manager. The SMS method does not offer positive fall protection/prevention and exposes team members to falling.
- For any work on roofs that is not considered roofing work (i.e. installing HVAC units on a roof), a warning line needs to be established at **15** feet from the edge or either guardrails or 100% tie off needs to be used.

Exception to working over or near water, bridge deck, open sided floors and roofing work sections: When team members are making an inspection, investigation or assessment of the workplace conditions prior to the actual start of the construction work or after all construction work has been completed fall protection/prevention may not be necessary providing project management and the applicable regional manager approve activities. A competent person must evaluate potential hazards and require fall protection/prevention measures if appropriate.

- 7.2.11 Shielding used for the containment of debris (on bridge deck/floor/roof/etc. demo) must be designed and approved by a competent person (registered professional engineer). If it is to be used as a working surface/platform for personnel it must also meet the criteria of the O.S.H.A. scaffolding standards. Activity plans shall be developed and during the entire installation/removal process, workers must be 100% tied off. This may be accomplished by installing horizontal lifelines using Cianbro/or manufactured approved system or equivalent engineered system. Once shielding is completely installed, inspected by the competent person, and found to be in compliance with the engineered design and the scaffolding standards, team members may work on it without being tied off, if approved by project management, until the demo operation starts. While the demo operation is in progress, no one will be allowed on the shielding without being 100% tied off. This includes any flagging, rigging, or cleaning tasks. Once the shielding is cleared and once again inspected by the competent person and found to be in compliance, team members will be allowed to work on the shielding if approved by project management without being tied off until the next demo operation starts.
- 7.2.12 Floor Openings (holes with a gap of 2" or more in the least dimension) shall be covered with materials capable of twice the expected loads and clearly marked with the word "hole" or "cover".(holes in roofs, floors, roads and other walking/working surfaces).
- 7.2.13 Erecting/Scaffolding requires 100% tie off over six feet until standard guardrails, midrails, and toe boards are installed. As a last resort the competent person may authorize tie off to structural support members of the scaffolding but only for scaffolds that are secured from tipping. When possible, the lifeline (lanyard) must be secured to an acceptable anchorage point above the harness "D" ring (in the center of your back) to protect against falls greater than six feet. Consider using a shorter lanyard or a retractable lanyard when working at lower heights. Refer to Cianbro's Scaffolding Safety Policy and Procedure for more details on the safe operations of scaffolds.
- 7.2.14 When Loading/Unloading Trucks (deliveries),
- 100% fall protection must be provided over ten feet for construction work.
 - You must protect at four feet when working at industrial facilities.

Remember, there may be special hazards when performing this activity at levels less than ten feet. Your activity plan should include fall prevention/protection measurers.

- 7.2.15 Fall Protection on Equipment
Operating Equipment up to ten feet does not require fall protection/prevention; functions such as access to and from crane operator cab or operating equipment from crane seat with the door open (using seat belts). Safe working access to and from the operating position is required to prevent potential hazards to the operator and lift director. Routine maintenance (inspection, checking fluid levels, cleaning, or other items listed on the weekly equipment card) up to ten feet does not require fall protection.

For non routine maintenance activities, fall protection is required at six feet, except when working at or near the draw-works (when the equipment is running), fall protection is required at 15 feet.

For Crane Assembly/Disassembly work fall protection is required for team members who are on a walking/working surface with an unprotected side or edge more than 10

feet above a lower level, except fall protection is required at 15 feet when the team member is:

- Near the draw works (when the equipment is running),
- On the deck in front of the drums,
- On the roof to hook up or adjust rigging to set or remove the house,
- On the roof to hook up or adjust rigging to set or remove the gantry,
- On the roof to spool the boom cable to set the bridle on the roof for shipment, and
- Setting or removing counter weight tray and the first counter weight on ringer.

The A/D director (Assembly/Disassembly director) will develop and maintain a working activity plan for each crane assembly/disassembly activity. The A/D director and A/D crew will maintain safe working practices during all A/D work. The AD director will be utilized and in charge on all A/D work according to OSHA 1926.1404

Assembly/Disassembly – general requirements (applies to all assembly and disassembly operations). The A/D director will have a full activity plan pointing out all hazards involved with A/D work, which will include when/where team members will be required to tie off.

- 7.2.16 Retrieval/Rescue Methods shall be identified and in place prior to start of work activities. Team members utilizing fall protection shall always be accompanied by another team member in the immediate vicinity. An emergency means of communication is also required. Fall victims are not normally able to assist in their own rescue and time is of the essence. It is critical that help is immediately available and retrieval/rescue plans initiated. Retrieval procedures shall be planned, communicated, and practiced for all team members prior to the start of any work activity.

You need to keep the rescue as simple as using an aerial lift, scissor lift or even a ladder to rescue someone. If your plan is to use 911 you must have the rescue team come to your site to review the area for access. Your plan should start with the rescue from below the worker not above them. Start on ground or floor below and work up to person to be rescued. All rescuers should be backed up with a secondary redundant system. You never cut the hanging person's lanyard, lift up the victim and release the latch. Cutting of the lifeline or lanyard can result in the accidental severing of adjacent rescue ropes and or lifelines.

Other types of retrieval/rescue systems include:

- Raising and lowering devices (man-rated winch)
- Backup Fall Arrest (SLR with Retrieval)
- Boatswain's chair with raising and lower device for back up system, (these systems can be also used for routine maintenance or construction operations).

Whatever system you use must have a team that has competent professional training and practice on a regular basis.

Suspension trauma (also known as orthostatic intolerance) is caused by hanging in a harness and restricting the blood flow to and from the legs. It can be fatal in less than 20 min. Include this in your rescue planning and training. Train team members to pump their legs frequently and to use equipment like suspension straps or self-rescuers if used.

- 7.2.17 **Tie off (Personal Fall Protection) to any mobile equipment (ie; cranes, loaders, etc.) is prohibited unless:** The project manager or superintendent must approve using mobile equipment as an anchorage point for tie off as the absolute last resort. If approved a detailed written activity plan, including lockout/tagout procedures, must be developed and approved by the project manager/superintendent.

- 7.2.18 Personal Fall Arrest Systems (PFAS) shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service. Also, annual inspections shall be conducted for all PFAS and all fall protection

system components, by a competent person other than the user. Fluorescent electrical tie wraps will be attached to the PFAS as documentation that the annual inspection was conducted by a competent person. There will be two colors, one for even years and one for odd years.

Those colors will be:

- 2015 – Fluorescent Yellow
- 2016 – Fluorescent Orange
- 2017 – Fluorescent Yellow
- 2018 – Fluorescent Orange

The colors will continue to alternate for odd and even years

Annual inspections are to be done during the month of January each year. Any equipment that is missed shall be checked as they are discovered.

When conducting inspections of fall arrest equipment look for the following:

- Webbing-Cuts, tears, abrasion, fraying, stretching, mold, chemical damage.
- D-rings-Cracks, breaks corrosion, rough edges.
- Tongue Buckle-distortions, added holes, broken grommets.
- Ropes-Abrasion, internal damage.

Inspection information:

Holes/burns: In critical areas of product such as lanyards. Shoulder or leg straps on full body harness, or on strength members of a product. If there is a burn hole of 1/16 inch diameter shall be grounds for rejection, more than two holes through the same strap are grounds for rejection. Holes on less critical components, such as chest strap or wear pads on harness up to ¼ inch diameter before the part is rejected. If there is a cut in webbing exceeding 1/8 inch in length is grounds for rejections, cuts in areas near dorsal D-ring of any length need to be taken out of service.

Stitching: More than two ripped or cut stitches in any pattern shall be taken out of service. Ripped or cut stitches may be an indication of being load impacted. Labels on fall protection equipment must be present and fully legible.

Heat damage: Areas damaged by heat (brown, hard areas by welding slag, flames, etc) shall be closely reviewed. Any large concentrations of damage are grounds to remove from service.

Hardware: Look for damage, cracks, distortion, sharp edges, burrs, worn parts, or corrosion in any of the hardware (buckles, d-rings, hooks, etc.). Make sure the back D-ring and backpad are free from damage and located between the shoulder blades. Make sure buckles connect securely and double locking snaphooks work properly. Make sure all keepers are in place.

Labels: All labels must be in place and legible.

Wire rope lanyards with shock absorbers: Wear gloves while inspecting. Flex the cable every few inches to expose breaks. If you find any of the conditions below then the lanyard must be removed from service and destroyed:

6 or more randomly distributed broken wires in one lay or

3 or more broken wires in one strand in one lay or

Any broken wires within one inch of the metal compression sleeves (swages) at either end of the assembly.

Any evidence of corrosion

Vertical lifelines (Synthetic Rope): Inspect rope for concentrated wear. Material must be free of frayed strands, broken yarns, cuts, abrasions, burns, and discoloration. The rope must also be free of knots, excessive soiling, paint build- up, and or rust staining. Rope splices must be tight with five full tucks, and thimbles must be held firmly by the splice. You need to check for burns, chemical damage: indicated by brown, discolored or brittle areas. Ultraviolet damage will be indicated by discoloration, splinters and slivers along the rope surface. All the factors mentioned above are known to reduce the

strength of the rope and shall be taken out of service. If you have any damage or question the integrity you need to take out of service.

7.3 Subcontractor Compliance

7.3.1 The Cianbro Fall Prevention Safety Policy and Procedure is referenced in each Cianbro subcontract agreement. This must be discussed during the subcontract **PreAward** and **PreConstruct** meetings.

7.3.2 Project management for Cianbro is responsible for the health and safety of Cianbro team members. Cianbro project management should also ensure subcontractors, visitors and other individuals on our projects comply with local, state and federal regulations, plus comply with Cianbro's Safety Policy and Procedure as outlined in our subcontractor safety agreement.

In the unlikely event that a particular work activity cannot be accomplished by fully complying with those conventional fall protection systems addressed in the Safety Policy and Procedure or greater hazard is introduced, the Safety Director and appropriate Regional Manager must approve in compliance with OSHA standard 1926.502(k).

Remember: The basic OSHA acceptable conventional fall protection/prevention systems include one of the following methods:

- 100% Tie Off
- Guarding of Unprotected Sides
- Safety Nets

7.4 Safety At Home

- When you have to work at elevated heights at home we want you to take what you learn at work and practice it at home.
- If you need to use fall arrest gear remember that the anchorage points must support 5,000 lbs.
- If you have not been trained in fall protection have your Project's Competent Person give you the training needed to wear, inspect and use fall arrest gear and proper anchorages.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

9.1 See attachments.

9.2 Please Note: Training manual for presenter and student is located on Cianbro.net under Resources| Manuals| Monthly Safety Training Calendar & Material 1.0 January & 1.1 January.

Fall Protection/Prevention Plan

1. Fall protection plan must be prepared by a competent person specific for the site and maintained up to date. Corporate safety department must review plans.
2. Original plan and any changes to the fall protection plan must be approved by the plan originator.
3. Copy of the fall protection plan must be retained at the job site and corporate safety department.
4. Implementation of the fall protection plan shall be under the supervision of a competent person.
5. Fall protection plan shall document reasons why conventional fall protection systems are infeasible or why their use would create a greater hazard.
6. Fall protection plan must include measures taken to reduce or eliminate the fall hazard for workers.
7. Fall protection plan shall identify locations to be classified as controlled access zones.
8. Fall protection plan must include names of each team member who is designed to work in controlled access zones. No other team member may enter.

The fall protection activity plan must also identify which option or combination of options selected from one of the following OSHA approved methods.

- A. **Warning Line System (WLS)** - A barrier erected to warn team members that they are approaching an unprotected edge or side, and which designates an area in which work may take place without the use of guardrails, body harnesses or safety net systems to protect team members in the area.

Warning Line Systems

1. Warning line erected around all sides of the work area.
 - a. Mechanical equipment is not used, warning line not less than six feet.
 - b. Mechanical equipment is being used, warning line not less than ten feet.
 - c. Non-roofing work performed on a roof, warning line not less than 15 feet.
2. Warning lines shall consist of ropes, wires or chains and supporting stanchions.
 - a. Flagged at not more than six-foot intervals.
 - b. Rope, wire or chain supported at the lowest point no less than 34 inches and the highest point is no more than 39 inches from walking/working surface.
 - c. Stanchions capable of resisting a force of at least 16 pounds applied horizontally, 30 inches above walking/working surfaces.
 - d. Rope, wire or chain shall have minimum tensile strength of 500 pounds.
 - e. Line shall be attached in such a way that the pulling line between stanchions will not result in slack in adjacent sections.
3. Mechanical equipment stored only where team members are protected by a warning line system, guardrail system or personal fall arrest system.

- B. **Controlled Access Zone (CAZ)** - An area in which certain work may take place without the use of guardrail systems, personal fall arrest systems or safety net systems and access to the zone is controlled.

Controlled Access Zones

1. Controlled access zone shall be defined by a control line or by other means that restricts access.
 - a. Control lines are used not less than six feet or more than 25 feet from leading edge.
 - b. Control lines shall extend length of unprotected leading edge.

- c. The control line shall be connected on each side to a guardrail or wall.
- 2. Control lines shall consist of ropes, wires, tapes or equivalent materials.
 - a. Each line shall be flagged or otherwise clearly marked at six-foot intervals with high-visibility material.
 - b. Each line supported at lowest point not less than 39 inches from the walking/working surface and highest point not more than 45 inches.
 - c. Each line shall have a minimum breaking strength of 200 pounds.
- C. **Safety Monitoring Systems (SMS)** - A safety system in which a competent person is responsible for recognizing and warning team members of fall hazards.
This S.M.S may only be used in conjunction with inspections, investigations or assessment of the workplace conditions prior to the actual start of construction work or after all construction work has been completed.
 - 1. Employer shall designate competent person to monitor safety of other team members.
 - a. Safety monitor shall be competent to recognize fall hazards.
 - b. Safety monitor shall warn the team member of a fall hazard.
 - c. Safety monitor will be on the same walking/working surface and within visual sighting distance of the team member being monitored.
 - d. Safety monitor shall be close enough to communicate orally.
 - e. Safety monitor shall not have other responsibilities.
 - 2. No team member other than team members engaged in barge work or covered by a fall protection plan are allowed in the area protected by safety monitoring system.
 - 3. Each team member in a controlled access zone shall comply promptly with fall hazard warnings from safety monitors. REMEMBER: The use of the above systems (WLS OR CAZ) must be a last resort used only if conventional methods cannot be put in place (guardrails, personal fall arrest systems or safety nets).

Policy Number: 012**Authorized By:** Michael W. Bennett**Title:** Hazard Communication Program**Effective Date:** 01/01/94Page 1 of 18

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 Team members have both a need and a right to know the hazards and identities of the chemicals they are exposed to or could potentially be exposed to in a foreseeable emergency when working. They also need to know what protective measures are available to prevent adverse effects from occurring. This policy is designed to provide team members with the information they need to safely work around hazardous chemicals.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Carcinogen: A material which either causes cancer in humans or because it causes cancer in animals is considered to be capable of causing cancer in humans.
- 4.2 Flashpoint: The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite.
- 4.3 Global Harmonized System (GHS): The Globally Harmonized System of Classification and Labelling of Chemicals is a system that defines and classifies the hazards of chemical products, and communicates health and safety information on labels and material safety data sheets (called Safety Data Sheets, or SDSs, in GHS).
- 4.4 Hazardous Materials Identification System (HMIS): Labeling system utilizes colored bars, numbers and symbols to convey the hazards of chemicals used in the workplace. It includes the chronic hazards associated with the chemicals.
- 4.5 Safety Data Sheets (SDS): Are detailed informational bulletins prepared by chemical manufacturers or importers. They outline and describe a product's physical and chemical properties, potential physical and health hazards, routes of exposure, precautions for safe handling and use, and emergency and first aid procedures.
- 4.6 NFPA 704 Hazard Identification Ratings System: Utilizes colored diamonds and numbers to convey the hazards of chemicals used in the workplace. It addresses the health, flammability, instability, and related hazards that may be presented as short-term, acute exposures that are most likely to occur as a result of fire, spill, or similar emergency. It is primarily intended for emergency responders and does not consider the chronic effects of chemicals.
- 4.7 Oxidizer: A chemical other than a blasting agent or explosive as defined in 1910.109(a) that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

- 4.8 Process Safety Management Standard: The Process Safety Management (PSM) of Highly Hazardous Chemicals standard, 29 CFR 1910.119 is intended to prevent or minimize the consequences of a catastrophic release of toxic, reactive, flammable or explosive highly hazardous chemicals from a process. It also identifies responsibilities of work site employers and contractor employers with respect to contractor employees involved in maintenance, repair, turnaround, major renovation or specialty work, on or near covered processes. Contractor employers are required to train their employees to safely perform their jobs, and document that employees received and understood training, and assure that contractor employees know about potential process hazards and the work site employer's emergency action plan, assure that employees follow safety rules of the facility, and advise the work site employer of hazards contract work itself poses or hazards identified by contractor employees. For additional information, refer to Cianbro's Process Safety Management Policy (Policy number 047)
- 4.9 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.

5 Policy

- 5.1 All team members, subcontractors, visitors and applicable project personnel **must** receive training on Cianbro's Hazard Communication Program before starting work at a new jobsite. Additional training must be done as part of the activity plan whenever a new product is being used.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviations from the requirements contained in this policy.
- 6.2 The top Cianbro Manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 The corporate safety department is responsible for maintaining this document.

7 Hazard Communication Program Index

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7.1 Team Member Training

All team members, subcontractors, visitors and applicable project personnel **must** receive training on Cianbro's Hazard Communication Program before starting work at a new jobsite. The project management is responsible for all training and training documentation.

7.1.1 Training

- All team members must receive annual training on Cianbro's Hazard Communication Program. There must be written documentation that each team member has completed their hazard communication training. These records must be kept at least three years. It is recommended that all sites do this training in May to be consistent.
- Team members must receive job-specific hazard communication training **before** starting work at a project as part of the jobsite orientation, and also whenever changes dictate such as (working with new hazardous material on-site.) It is mandatory to include any new hazardous material (or a change in the way a hazardous material is used etc.) as part of the activity plan crew review. This needs to include known specific hazardous materials in our work areas.
- If the training involves non-English speaking team members, then the training must be provided in their native language. This can be done either by using trainers that speak their language or by using a translator in conjunction with the English speaking trainer. Bilingual team members may be used to fill the translator role. The training documentation must include the language in which the training was conducted.

7.1.2 Training Topics

All training must be job-specific and should address the following in each activity plan:

- A. Physical and Health Hazards in the Work Area: Provide specific information about the potential physical and health hazards of each hazardous material the team member will be exposed to or could be exposed to in a foreseeable emergency. Please see Appendix B – Hydrogen Sulfide Awareness and Appendix C – Benzene Awareness for examples of training material regarding specific hazardous materials.
- B. Detecting a Hazardous Chemical Release into the Environment: Outline the available methods and/or equipment to detect a chemical release in the work area – chemical odor and/or visibility, monitoring equipment, alarms, etc.
- C. Gas Hazard Awareness
 - Location and types of gas monitoring equipment and location of alarm stations
 - Characteristics of the specific gases in the work areas
 - Signs and symptoms of exposure to specific gases
 - Emergency procedures and rally points
 - Refer to 005 Respiratory Protection Program Safety Policy and Procedure for Respiratory Protection

- D. Monitoring for Gas Hazards:
 - Personal portable gas detectors must be utilized in high gas hazard areas such as areas where an H₂S release is possible.
 - All gas monitors must be calibrated per manufacturer's recommendations (but no less than once per month) and have a current calibration sticker affixed to it unless the calibration information can be accessed on the monitor.
 - All gas monitors must be bump tested each day it is to be used to ensure it is working correctly.
- E. Team Member Protection: Provide training on the engineering and administrative controls that will be used to control the hazards. Assist team members with the proper use and selection of personal protective equipment for the degree of the chemical hazard.
- F. Hazard Communication: Provide training on the location of SDS's, how to read each section of the SDS, how to read a label and determine the degree of hazard, how to protect one's self from each chemical substance, and how to respond in an emergency situation. This training should be part of the job site orientation.
- G. Hazards of Non-Routine Tasks: Provide special training, including MSDS, labeling, potential hazards, and precautionary measures as part of the activity plan regarding non-routine work assignments with hazardous materials.
- H. Hazards of Chemicals in Unlabeled Pipes: Never assume that an unmarked pipe is empty or is carrying a non-hazardous material. Always determine what the pipe carries and have it flushed, drained and locked out if necessary before working on or around it.
- I. Project Contingency Plan: Outline the project's hazardous materials and waste contingency plan (required site emergency plan) – the emergency action procedures (including provisions for an evacuation drill) and chain of command.

Note: Team members performing maintenance, major renovations, or specialty work on or adjacent to a chemical process (lime kiln, chlorine dioxide (ClO₂) process, etc.) are required to have specific training under OSHA's Process Safety Management Standard. Please communicate with your project owner to see if this applies to your activity.

- 7.1.3 New Hazardous Materials or Uses of Hazardous Materials Onsite
Whenever a new hazardous material or new use of a hazardous material is introduced to the work area; team members must be trained in the hazards of the substance, how to protect themselves, and how to recognize a release. In order to meet this requirement, *the information must be included with the activity plan.*

7.2 Container Labeling and Other Warning Forms

7.2.1 Container Labeling

- All containers, original or secondary, must be marked with either an original manufacturer's label or a Cianbro-generated secondary label.
- All container labels must contain the identity of the hazardous chemical, appropriate hazard warnings (whether it be through pictures and symbols or both), and the name and address of the chemical manufacturer, importer or other responsible party.
- All Cianbro team members are responsible for ensuring project containers are legibly labeled.
- Team members are not to remove or deface labels on containers of hazardous chemicals.
- It is recommended that Cianbro projects use the Hazardous Materials Identification System (HMIS) labeling system because the ratings take into account both chronic and acute health effects. The National Fire Protection Association (NFPA) labeling system is also acceptable, but use only one or the other, not both. Both systems identify the material by name and classify the hazards on a scale of zero (no danger) to four (most dangerous). Each material is rated according to its Health Hazard, Flammability, and Reactivity. The HMIS system also includes a code for recommended personal protective equipment and the NFPA system includes a symbol for Specific Hazards. Both secondary labeling systems need to have target

organs and routes of entry added to them.
See 9.1 Appendix A.

- SDS's provide labeling information and, in most cases, numbers for the HMIS and the NFPA rating systems. Contact the site safety specialist or the Corporate Safety Department if there are any labeling questions.

7.2.2 Other Warning Forms

Signs and barricaded areas warn project personnel and visitors about jobsite hazardous materials. For example, contaminated areas in a mill should be barricaded off from regular traffic. Also, lead work areas should have clearly posted signs describing the specific hazards.

7.2.3 Manufacturers Shipping Label Requirements under the new GHS Standard

Labels from manufacturers will contain the following six elements:

- **Product Identifier:** How the hazardous chemical is identified. This can be (but is not limited to): the chemical name, code number or batch number. The manufacturer, importer or distributor can decide the appropriate product identifier. The same product identifier must be both on the label and in Section 1 of the SDS (Identification).
- **Pictogram:** A symbol plus other graphic elements, such as a border, background pattern, or color that is intended to convey specific information about the hazards of a chemical. Each pictogram consists of a different symbol on a white background within a red square frame set on a point (i.e. a red diamond). There are nine pictograms under the GHS. However, only eight pictograms are required under the HCS.
- **Signal words:** A single word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are "danger" and "warning." "Danger" is used for the more severe hazards, while "warning" is used for less severe hazards.
- **Hazard Statement:** A statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.
- **Precautionary Statement:** A phrase that describes recommended measures to be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling of a hazardous chemical.
- **Name, address, and telephone number of manufacturer**

7.3 Safety Data Sheets (SDS)

Safety Data Sheets are detailed informational bulletins prepared by chemical manufacturers or importers. They outline and describe a product's physical and chemical properties, potential physical and health hazards, routes of exposure, precautions for safe handling and use, and emergency and first aid procedures. SDS's help employers and team members plan for daily hazardous materials exposures and emergency situations.

7.3.1 Project management must maintain the SDS record and ensure that each team member has knowledge about the site's hazardous substances. Their responsibilities include the following:

- A. There must be a current SDS on-site for all project hazardous materials.
- B. SDS' must be kept together in a central location that is "readily accessible" at all times to team members. On some projects this may require more than one SDS book as necessary for team member accessibility.
- C. SDS books/files must contain a current index, or list, of all known on-site hazardous materials. ***They must be organized alphabetically by product name.***
- D. All team members must be trained on the location of their project SDS's. These SDS's must be readily accessible to every team member, regardless of what shift they are on.
- E. SDS's may be kept in an electronic format if all three of the following conditions are met 100%:
 - Every team member on site has been trained on how to retrieve an SDS to a level that they could do it without any help.

- Every team member has access to the electronic media at any time they are working.
 - There is a back up plan/method available in case the power is out or the equipment is not working.
- F. All team members must be trained to read and to interpret information from their project's SDS.
- G. Manufacturers/distributors must provide a SDS with hazardous materials shipments or deliveries. They are also responsible for providing SDS revisions when necessary.
- H. If a product arrives without a SDS, it is the project management's responsibility to obtain this data from the manufacturer/distributor before product use.
- I. Projects must create an SDS ebinder through MSDSONline. All updates to the SDS ebinder will then be managed by MSDSONline. Cianbro must have a central file copy of all SDSs to meet federal reporting requirements.
- J. Be sure to include SDS copies for all applicable materials being utilized in the associated work activity plan.
- K. It is the project management team's responsibility to ensure that no hazardous material is brought on site without the appropriate SDS.
- L. SDS should be no more than three years old, unless there is not a more current SDS available from the manufacturer.

7.4 Subcontractor Requirements

- Subcontractors must meet the requirements of 29 CFR 1926.59 and Cianbro's written Hazard Communication Program.
- The project management team must provide all affected contractors with the identity of the hazards, the appropriate SDS or access to the SDS and necessary precautions they should take to lessen the possibility of exposure.
- The subcontractor must provide Cianbro with copies of SDSs for all hazardous materials they bring on-site **prior** to bringing that material on-site. When the job is complete, the subcontractor is responsible for removing all unused hazardous material that they brought on-site.
- Project management must ensure that personnel for subcontractors of Cianbro have received HazCom training.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments.

Team Member Reference Summary

National Fire Protection Association NFPA

HEALTH HAZARD

- 4 Deadly
- 3 Extreme Danger
- 2 Hazardous
- 1 Slightly Hazardous
- 0 Normal Material

Specific Hazard

- ACID—Acid
- ALK—Alkali
- COR—Corrosive
- OXY—Oxidizer
- P—Polymerization
- Radioactive
- Use No Water

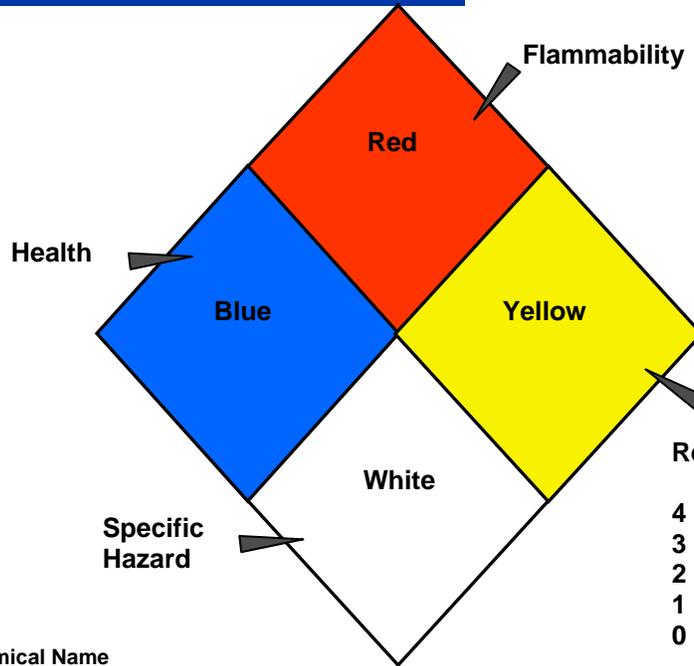
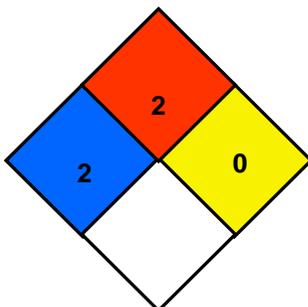
ACETIC ACID
(Vinegar Acid)

Company Name
123 Example
City, State ZIP

Manufacturers' Name & Address

WARNINGS

ACETIC ACID (EXAMPLE)	
HEALTH	2
FLAMMABILITY	2
REACTIVITY	0
PERSONAL PROTECTION	X



FIRE HAZARD

- Flash Points
- 4 Below 73° F
 - 3 Below 100° F
 - 2 Above 100° F, Not Exceeding 200° F
 - 1 Above 200° F
 - 0 Will Not Burn

Reactivity

- 4 May Detonate
- 3 Shot & Heat May Detonate
- 2 Violent Chemical Change
- 1 Unstable if Heated
- 0 Stable

Hazardous Material Identification System HMIS

A				
B				
C				
D				
E				
F				
G				
H				
I				
J				
K				

X Ask your supervisor for specialized handling directions.

HEALTH	2
FLAMMABILITY	2
REACTIVITY	0
PERSONAL PROTECTION	X

General Hazard Index

- 4 Severe
- 3 Serious
- 2 Moderate
- 1 Slight
- 0 Minimal

Reference: www.paint.org intec

Rev. 06/05/2008

Hydrogen Sulfide Awareness

Introduction

Cianbro team members have the right to know about possible hazards that may be present in their work area(s) and how to protect themselves from such hazards. Our Hazard Communication Program provides a general overview of how such hazards must be managed at the jobsite. Some hazards are more common to certain activities and/or work locations and planning for possible team member exposures should be a daily process. In order to help project locations with planning and training processes relating to specific hazardous materials, this hazardous material awareness sheet has been created to address possible team member exposure to Hydrogen Sulfide gas.

Hydrogen Sulfide (H₂S) is a flammable, colorless gas that is toxic at extremely low concentrations. It is heavier than air, and may accumulate in low-lying areas. It smells like "rotten eggs" at low concentrations and causes you to quickly lose your sense of smell. H₂S is found widely in industry. It is formed by the decomposition of organic materials, so it is found in natural gas and oil, in mines, wells, fertilizers, and sewers. It is given off as a by-product in the manufacture of pulp and paper products, synthetic rubber, dyes and the tanning of leather. Cianbro team members can expect to find H₂S in sewers, water treatment facilities, around recovery boilers/evaporators and in pulp mills. It should be noted that partially dried paper stock can release H₂S if it is disturbed.

Permissible Exposure

The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a Threshold Limit Value (TLV) of 10ppm and a short-term exposure (STEL) limit of 15ppm averaged over 15 minutes. Exposure at the STEL should not be repeated more than four times per day with at least 60 minutes between successive exposures in this range. Cianbro will adhere to these limits.

Health Hazard Data

Acute effects of exposure

First of all, and most importantly, H₂S can kill you. The extent of acute poisoning danger depends on the concentration of H₂S in the atmosphere.

When you breathe in H₂S, it goes directly through your lungs and into your bloodstream. To protect itself, your body "oxidizes" (breaks down) the H₂S as rapidly as possible into a harmless compound. If you breathe in so much H₂S that your body can't oxidize all of it, the H₂S builds up in the blood and you become poisoned. The nervous centers in your brain which control breathing are paralyzed. Your lungs stop working and you are asphyxiated - just as though someone had come up and put their hands around your neck and strangled you. A worker can be overcome by H₂S and lose consciousness in a few seconds; luckily if he is rescued in time and is given artificial respiration within a few minutes, the worker may recover.

Chronic effects of exposure

H₂S can also cause a wide range of sub-acute and chronic effects. At very low concentrations of 10-100 ppm.) headache, dizziness, nausea and vomiting may develop, together with irritation of the eyes and respiratory tract. The eyes become red, sore, inflamed, and sensitive to light. Respiratory system effects include cough, pain in the nose and throat, and pain on breathing.

If exposure at low levels continues, the worker may develop a state of chronic poisoning. In addition to eye and respiratory tract irritation, there will be a slowed pulse rate, fatigue, insomnia, digestive disturbances, and cold sweats. More dangerous, if exposure at the level of 100 ppm (which results in eye and respiratory tract irritation and drowsiness after 15 minutes) lasts for several hours, it may result in death within the next 48 hours. Symptoms of chronic exposures at low levels are conjunctivitis (eye infections), headache, and attacks of dizziness, diarrhea, and loss of weight.

Chronic hydrogen sulfide intoxication is marked by headaches, eye disorders, chronic bronchitis, and a grey-green line on the gums.

Precautions for Safe Use, Handling and Storage

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. The engineering controls also need to keep gas, vapor or dust concentrations below any explosive limits. Use explosion-proof ventilation equipment.

Monitoring equipment set to alarm at preset PEL levels (20 ppm for 1910 General Industry Standards and 10 ppm for 1926 Construction Standards) must be utilized to confirm that team member exposure is kept in acceptable ranges. Industrial facilities utilize permanent, stationary devices to continuously monitor levels. Hand held portable monitors can also be utilized by certified individuals.

An immediate evacuation must take place whenever warning alarms are activated.

Protective Clothing and Equipment

Respirators - Respirators are required for those operations in which engineering controls or work practice controls are not feasible to reduce exposure to the permissible level. If respirators are worn, use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

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

Eye and Face Protection - You must wear appropriate eye protection (glasses, goggles, full face respirator) based on the possible exposure levels.

Emergency and First Aid Procedures

Eyes - PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES. Flush contaminated eyes with large amounts of water for at least 15 minutes. Part eyelids with fingers to ensure complete flushing. If irritation persists, seek medical attention immediately.

Skin - Flush affected area with water. If irritation persists, consult a physician.

Ingestion - Treat in a manner similar to inhalation exposure. Seek medical attention as soon as possible.

Inhalation - PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND SHOULD RECOGNIZE THE HAZARDS OF OVEREXPOSURE DUE TO OLFACTORY FATIGUE.

An extreme fire hazard exists when rescuing semiconscious or unconscious persons due to the flammability hazard. Avoid use of rescue equipment which may contain ignition sources or cause static discharge. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen or a mixture of 5% carbon dioxide in oxygen. Keep victim calm and warm. Further treatment should be symptomatic and supportive. Seek medical assistance immediately.

Training

Team members shall receive documented training prior to starting work on a project where Hydrogen Sulfide is present. The training must be job specific and should address the following;

1. Locations where hydrogen sulfide may be present in the workplace including any host facility/client requirements relating to Hydrogen Sulfide.
2. Identification of the characteristics, sources, and hazards of Hydrogen Sulfide including symptoms of exposure.
3. Do not rely solely on sense of smell to identify the presence of H₂S. It has a foul rotten egg odor and in low concentrations, H₂S sometimes can be detectable by its characteristic odor; however, the smell cannot be relied upon to warn of dangerous concentrations (greater than 100ppm) of the gas because it rapidly paralyzes the sense of smell due to paralysis of the olfactory nerve. A longer exposure to the lower concentrations has a similar desensitizing effect on the sense of smell. If you stop smelling it, it doesn't mean it has dissipated. It may have deadened your sense of smell. Leave the area immediately and utilize monitoring equipment to confirm exposure levels.
4. How to recognize tasks that might result in occupational exposure to Hydrogen Sulfide.
5. Recognition of, and proper response to, Hydrogen Sulfide warnings at the workplace including immediate evacuation when warning alarms are activated.
6. How to limit exposure by using work practice and engineering controls.
7. Locations and use of emergency safety equipment.
8. How to obtain information on the types, selection, proper use, location, removal, handling, decontamination and disposal of PPE.
9. The provisions of site specific contingency/emergency plans.
10. Who to contact and what to do in an emergency.

Benzene Awareness

Introduction

Cianbro team members have the right to know about possible hazards that may be present in their work area(s) and how to protect themselves from such hazards. Our Hazard Communication Program provides a general overview of how such hazards must be managed at the jobsite. Some hazards are more common to certain activities and/or work locations and planning for possible team member exposures should be a daily process. In order to help project locations with planning and training processes relating to specific hazardous materials, this hazardous material awareness sheet has been created to address possible team member exposure to benzene.

Benzene is an aromatic hydrocarbon that is produced by the burning of natural products. It is a clear, colorless liquid with a pleasant, sweet odor. The odor of benzene does not provide adequate warning of its hazard. It is a component of products derived from coal and petroleum and is found in gasoline and other fuels. With this in mind, the most likely possible exposure to benzene for Cianbro team members is during the fueling of vehicles and other equipment and also from breathing vehicle and equipment exhaust fumes. Benzene is used in the manufacture of plastics, detergents, pesticides, and other chemicals. It is estimated that about half of the total population burden of exposure to benzene is from the 50 million people who smoke cigarettes. A smoker is exposed to 10 times the levels of benzene compared to the exposure of a non-smoker. Research has shown benzene to be a carcinogen (cancer-causing).

Permissible Exposure

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

Health Hazard Data

Benzene can affect your health if you inhale it, or if it comes in contact with your skin or eyes. Benzene is also harmful if you happen to swallow it. Effects of overexposure include;

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

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

Precautions for Safe Use, Handling and Storage

Benzene liquid is highly flammable. It should be stored in tightly closed containers in a cool, well ventilated area. Benzene vapor may form explosive mixtures in air. All sources of ignition must be controlled. Use non-sparking tools when opening or closing benzene containers. Fire extinguishers, where provided, must be readily available. Know where they are located and how to operate them. Smoking is prohibited in areas where benzene is used or stored. It is also important to avoid gasoline and diesel fumes during fueling activities and to reduce team member exposure to exhaust fumes as much as possible.

Protective Clothing and Equipment

Respirators - Respirators are required for those operations in which engineering controls or work practice controls are not feasible to reduce exposure to the permissible level. If respirators are worn, they must have joint Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) seal of approval, and cartridge or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. If you experience difficulty breathing while wearing a respirator, you may request a positive pressure respirator. You must be thoroughly trained to use the assigned respirator, and the training will be provided by your employer.

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

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

Emergency and First Aid Procedures

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

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

Breathing - If you or any other person breathes in large amounts of benzene, get the exposed person to fresh air at once. Apply artificial respiration if breathing has stopped. Call for medical assistance or a doctor as soon as possible.

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

Training

Team members shall receive documented training prior to starting work on a project where Benzene is present. The training must be job specific and should address the following;

1. Locations where benzene is used in a host facility and any client requirements relating to benzene.
2. The provisions of site specific contingency/emergency plans.
3. How to recognize tasks that might result in occupational exposure to benzene.
4. How to limit exposure by using work practice and engineering controls.
5. How to obtain information on the types, selection, proper use, location, removal, handling, decontamination and disposal of PPE; and
6. Who to contact and what to do in an emergency.

Hazard Communication Safety Data Sheets

The Hazard Communication Standard (HCS) requires chemical manufacturers, distributors, or importers to provide Safety Data Sheets (SDSs) (formerly known as Material Safety Data Sheets or MSDSs) to communicate the hazards of hazardous chemical products. As of June 1, 2015, the HCS will require new SDSs to be in a uniform format, and include the section numbers, the headings, and associated information under the headings below:

Section 1, Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2, Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3, Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4, First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5, Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6, Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7, Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8, Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9, Physical and chemical properties lists the chemical's characteristics.

Section 10, Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11, Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12, Ecological information*

Section 13, Disposal considerations*

Section 14, Transport information*

Section 15, Regulatory information*

Section 16, Other information, includes the date of preparation or last revision.

9.5 Appendix E

There are nine pictograms under the GHS to convey the health, physical and environmental hazards. The final Hazard Communication Standard (HCS) requires eight of these pictograms, the exception being the environmental pictogram, as environmental hazards are not within OSHA's jurisdiction. The hazard pictograms and their corresponding hazards are shown below.

HCS Pictograms and Hazards

Health Hazard 	Flame 	Exclamation Mark 
<ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity 	<ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides 	<ul style="list-style-type: none"> • Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non Mandatory)
Gas Cylinder 	Corrosion 	Exploding Bomb 
<ul style="list-style-type: none"> • Gases under Pressure 	<ul style="list-style-type: none"> • Skin Corrosion/ burns • Eye Damage • Corrosive to Metals 	<ul style="list-style-type: none"> • Explosives • Self-Reactives • Organic Peroxides
Flame over Circle 	Environment (Non Mandatory) 	Skull and Crossbones 
<ul style="list-style-type: none"> • Oxidizers 	<ul style="list-style-type: none"> • Aquatic Toxicity 	<ul style="list-style-type: none"> • Acute Toxicity (fatal or toxic)

GHS Hazard Statements

Physical Hazards

- H200: Unstable explosive
- H201: Explosive; mass explosion hazard
- H202: Explosive; severe projection hazard
- H203: Explosive; fire, blast or projection hazard
- H204: Fire or projection hazard
- H205: May mass explode in fire
- H220: Extremely flammable gas
- H221: Flammable gas
- H222: Extremely flammable aerosol
- H223: Flammable aerosol
- H224: Extremely flammable liquid and vapour
- H225: Highly flammable liquid and vapour
- H226: Flammable liquid and vapour
- H227: Combustible liquid
- H228: Flammable solid
- H240: Heating may cause an explosion
- H241: Heating may cause a fire or explosion
- H242: Heating may cause a fire
- H250: Catches fire spontaneously if exposed to air
- H251: Self-heating; may catch fire
- H252: Self-heating in large quantities; may catch fire
- H260: In contact with water releases flammable gases which may ignite spontaneously
- H261: In contact with water releases flammable gas
- H270: May cause or intensify fire; oxidizer
- H271: May cause fire or explosion; strong oxidizer
- H272: May intensify fire; oxidizer
- H280: Contains gas under pressure; may explode if heated
- H281: Contains refrigerated gas; may cause cryogenic burns or injury
- H290: May be corrosive to metals

Health Hazards

- H300: Fatal if swallowed
- H301: Toxic if swallowed
- H302: Harmful if swallowed
- H303: May be harmful if swallowed
- H304: May be fatal if swallowed and enters airways
- H305: May be harmful if swallowed and enters airways
- H310: Fatal in contact with skin
- H311: Toxic in contact with skin
- H312: Harmful in contact with skin
- H313: May be harmful in contact with skin
- H314: Causes severe skin burns and eye damage
- H315: Causes skin irritation
- H316: Causes mild skin irritation
- H317: May cause an allergic skin reaction
- H318: Causes serious eye damage
- H319: Causes serious eye irritation
- H320: Causes eye irritation
- H330: Fatal if inhaled
- H331: Toxic if inhaled
- H332: Harmful if inhaled

- H333: May be harmful if inhaled
- H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H335: May cause respiratory irritation
- H336: May cause drowsiness or dizziness
- H340: May cause genetic defects
- H341: Suspected of causing genetic defects
- H350: May cause cancer
- H351: Suspected of causing cancer
- H360: May damage fertility or the unborn child
- H361: Suspected of damaging fertility or the unborn child
- H362: May cause harm to breast-fed children
- H370: Causes damage to organs
- H371: May cause damage to organs
- H372: Causes damage to organs through prolonged or repeated exposure
- H373: May cause damage to organs through prolonged or repeated exposure

Environmental Hazards

- H400: Very toxic to aquatic life
- H401: Toxic to aquatic life
- H402: Harmful to aquatic life
- H410: Very toxic to aquatic life with long lasting effects
- H411: Toxic to aquatic life with long lasting effects
- H412: Harmful to aquatic life with long lasting effects
- H413: May cause long lasting harmful effects to aquatic life
- H420: Harms public health and the environment by destroying ozone in the upper atmosphere

Precautionary Statements

General precautionary statements

- P101: If medical advice is needed, have product container or label at hand
- P102: Keep out of reach of children
- P103: Read label before use

Prevention precautionary statements

- P201: Obtain special instructions before use
- P202: Do not handle until all safety precautions have been read and understood
- P210: Keep away from heat/sparks/open flames/hot surfaces – No smoking
- P211: Do not spray on an open flame or other ignition source
- P220: Keep/Store away from clothing/.../combustible materials
- P221: Take any precaution to avoid mixing with combustibles
- P222: Do not allow contact with air
- P223: Keep away from any possible contact with water, because of violent reaction and possible flash fire
- P230: Keep wetted with ...
- P231: Handle under inert gas
- P232: Protect from moisture
- P233: Keep container tightly closed
- P234: Keep only in original container
- P235: Keep cool
- P240: Ground/bond container and receiving equipment
- P241: Use explosion-proof electrical/ventilating/light/.../equipment
- P242: Use only non-sparking tools
- P243: Take precautionary measures against static discharge
- P244: Keep reduction valves free from grease and oil
- P250: Do not subject to grinding/shock/.../friction
- P251: Pressurized container – Do not pierce or burn, even after use
- P260: Do not breathe dust/fume/gas/mist/vapours/spray
- P261: Avoid breathing dust/fume/gas/mist/vapours/spray
- P262: Do not get in eyes, on skin, or on clothing
- P263: Avoid contact during pregnancy/while nursing
- P264: Wash ... thoroughly after handling
- P270: Do not eat, drink or smoke when using this product
- P271: Use only outdoors or in a well-ventilated area
- P272: Contaminated work clothing should not be allowed out of the workplace
- P273: Avoid release to the environment
- P280: Wear protective gloves/protective clothing/eye protection/face protection
- P281: Use personal protective equipment as required
- P282: Wear cold insulating gloves/face shield/eye protection
- P283: Wear fire/flame resistant/retardant clothing
- P284: Wear respiratory protection
- P285: In case of inadequate ventilation wear respiratory protection
- P231+232: Handle under inert gas. Protect from moisture
- P235+410: Keep cool. Protect from sunlight

Response precautionary statements

- P301: IF SWALLOWED:
- P302: IF ON SKIN:
- P303: IF ON SKIN (or hair):
- P304: IF INHALED:
- P305: IF IN EYES:

- P306: IF ON CLOTHING:
- P307: IF exposed:
- P308: IF exposed or concerned:
- P309: IF exposed or you feel unwell:
- P310: Immediately call a POISON CENTER or doctor/physician
- P311: Call a POISON CENTER or doctor/physician
- P312: Call a POISON CENTER or doctor/physician if you feel unwell
- P313: Get medical advice/attention
- P314: Get Medical advice/attention if you feel unwell
- P315: Get immediate medical advice/attention
- P320: Specific treatment is urgent (see ... on this label)
- P321: Specific treatment (see ... on this label)
- P322: Specific measures (see ... on this label)
- P330: Rinse mouth
- P331: Do NOT induce vomiting
- P332: If skin irritation occurs:
- P333: If skin irritation or a rash occurs:
- P334: Immerse in cool water/wrap in wet bandages
- P335: Brush off loose particles from skin
- P336: Thaw frosted parts with lukewarm water. Do not rub affected areas
- P337: If eye irritation persists:
- P338: Remove contact lenses if present and easy to do. continue rinsing
- P340: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- P341: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
- P342: If experiencing respiratory symptoms:
- P350: Gently wash with soap and water
- P351: Rinse cautiously with water for several minutes
- P352: Wash with soap and water
- P353: Rinse skin with water/shower
- P360: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
- P361: Remove/Take off immediately all contaminated clothing
- P362: Take off contaminated clothing and wash before reuse
- P363: Wash contaminated clothing before reuse
- P370: In case of fire:
- P371: In case of major fire and large quantities:
- P372: Explosion risk in case of fire
- P373: DO NOT fight fire when fire reaches explosives
- P374: Fight fire with normal precautions from a reasonable distance
- P375: Fight fire remotely due to the risk of explosion
- P376: Stop leak if safe to do so
- P377: Leaking gas fire – do not extinguish unless leak can be stopped safely
- P378: Use ... for extinction
- P380: Evacuate area
- P381: Eliminate all ignition sources if safe to do so
- P391 : Collect spillage
- P301+310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
- P301+312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
- P301+330+331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
- P302+334: IF ON SKIN: Immerse in cool water/wrap in wet bandages
- P302+350: IF ON SKIN: Gently wash with soap and water
- P302+352: IF ON SKIN: Wash with soap and water
- P303+361+353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
- P304+312: IF INHALED: Call a POISON CENTER or doctor/physician if you feel unwell
- P304+340: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

- P304+341: IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
- P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
- P306+360: IF ON CLOTHING: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes
- P307+311: IF exposed: Call a POISON CENTER or doctor/physician
- P308+313: IF exposed or concerned: Get medical advice/attention
- P309+311: IF exposed or you feel unwell: Call a POISON CENTER or doctor/physician
- P332+313: If skin irritation occurs: Get medical advice/attention
- P333+313: If skin irritation or a rash occurs: Get medical advice/attention
- P335+334: Brush off loose particles from skin. Immerse in cool water/wrap in wet bandages
- P337+313: If eye irritation persists get medical advice/attention
- P342+311: If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician
- P370+376: In case of fire: Stop leak if safe to do so
- P370+378: In case of fire: Use ... for extinction
- P370+380: In case of fire: Evacuate area
- P370+380+375: In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion
- P371+380+375: In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion

Storage precautionary statements

- P401: Store ...
- P402: Store in a dry place
- P403: Store in a well ventilated place
- P404: Store in a closed container
- P405: Store locked up
- P406: Store in a corrosive resistant/... container with a resistant inner liner
- P407: Maintain air gap between stacks/pallets
- P410: Protect from sunlight
- P411: Store at temperatures not exceeding ... °C/... °F
- P412: Do not expose to temperatures exceeding 50 °C/122 °F
- P420: Store away from other materials
- P422: Store contents under ...
- P402+404: Store in a dry place. Store in a closed container
- P403+233: Store in a well ventilated place. Keep container tightly closed
- P403+235: Store in a well ventilated place. Keep cool
- P410+403: Protect from sunlight. Store in a well ventilated place
- P410+412: Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F
- P411+235: Store at temperatures not exceeding ... °C/... °F. Keep cool

Disposal precautionary statements

- P501: Dispose of contents/container to ...

Policy Number: 013**Authorized By:** Michael W. Bennett**Title:** Chain Saw Safety**Effective Date:** 09/22/2008Page 1 of 5

1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 Chain saw work is one of the most dangerous work activities in the country. This Safety Policy and Procedure provides the safety considerations needed to operate a gasoline or electric powered chain saw safely.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Chain Saw:** A portable power saw with an endless chain that carries the cutting teeth used for cutting wood. Wood products could range from felling trees, cutting fire wood/ stacks of lumber (lagging boards) to cutting timber piles in water. Today, the most common types of chain saws used in construction or demolition are:
- Gasoline or gasoline/2 cycle oil powered chain saws.
 - Electric (110v A/C) powered saws.
 - Electric (battery – DC v) powered saws (trimming)
 - Hydraulic driven chain saw (useful for cutting wooden piles below the waterline).
 - Pneumatic (compressed air) driven chain saws (can also be used in water).
- 4.2 **MSDS: Material Safety Data Sheet** -In reference to chainsaws - An information sheet that discusses the Health – Fire and other hazards associated with the chain oil, gasoline and two-cycle oil. Needs to be discussed as part of the training.
- 4.3 **Felling:** The action of cutting down a tree.
- 4.4 **Kick Back:** A strong thrust of the saw back toward the operator generally resulting from improper use of the nose of the bar or the pinching of the bar in a cut. Kickback causes loss of control of the saw that could cause an injury. Kick-back also refers to a tree jumping back over the stump toward the operator.
- 4.5 **Notch:** A cut in a tree to guide the direction of the tree's fall and to prevent splitting or kickback.
- 4.6 **Back Cuts (or felling cuts):** The last of the three cuts required to fall a tree. Located on the opposite side of the tree from the face and minimally 1" above the horizontal cut of the face. The 1" is referred to as a 'stump shot' and prevents the tree from kicking back over the stump toward the operator. The back cut must never be continued to a point at which no holding wood remains.

- 4.7 Wedges: Triangular shaped device made of wood, hard plastic or steel. Used during the felling process to prevent the tree from falling backwards and controls the direction of the falling tree. Also keeps the chainsaw bar from being pinched.
- 4.8 Hand Guard: A defensive plastic or metal shield placed between the handle and the saw's chain. Its purpose is to protect a user's hands from kickback.
- 4.9 Chaps: A PPE for leg protection. Made of Kevlar material to protect the legs by binding up the chain before cutting through the material to the legs.
- 4.10 Chain Catcher: A metal or plastic guard designed to prevent a broken or derailed saw chain from striking the operator.
- 4.11 Stack Cutting: Using a chainsaw, usually having a longer chain bar, to cut several pieces of lumber at one time. i.e.: Snapping a chalk line across a stack of lumber and then cutting.

5 Policy

- 5.1 To comply with all applicable OSHA 29 CFR 1926, 1910, MSHA and ANSI standards.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of chain saws under this policy.
- 6.2 The top Cianbro Manager of the job site is responsible for the implementation of this policy on the project.
- 6.3 The corporate safety department is responsible for maintaining this document.
- 6.4 Supervisors must ensure that they select a team member who is knowledgeable about the operations of chainsaws and safety requirements for completing the assigned tasks.

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7.1 Personal Protective Equipment (P.P. E.)

Proper P.P.E. for the job is essential for chain saw use. The need for some type of special protective equipment may change from operation to operation; however, the following are minimum requirements:

7.1.1 Clothing should be loose enough to permit movement, but without frayed cuffs, loose shirttails or dangling belts.

7.1.2 Hard hats, face shields, and safety glasses with side shields.

7.1.3 Hard toe boots.

7.1.4 Gloves.

7.1.5 Hearing Protection.

7.1.6 Chaps - (Chaps do not always prevent injuries, but will help diminish the severity.)

7.1.7 Foot covers (Duckbills)-In some circumstances, use of foot covers (duckbills) and chain saw jackets or capes should be considered.

7.2 Saw Inspection

Before each use, chain saws must be inspected for the following reasons:

7.2.1 All parts, especially handles and safety devices, are to be securely attached.

7.2.2 Chain sharpness and properly adjusted chain tension.

7.2.3 Chain brake operating properly. (Brakes are required on all chain saws.)

7.2.4 Correct gas/oil mixture available and saw filled.

7.2.5 Chain oil reservoir filled and oiler working properly.

7.2.6 Throttle operating freely.

7.2.7 For electric chain saws: check cords for cuts - grounding pin - use of GFCI (NOTE: check wire size (gauge) of cord to avoid a slower running saw or tripping a GFCI.)

7.2.8 Please be sure that gas/oil containers are properly labeled and MSDS precautions are communicated.

7.3 Fueling and Starting

7.3.1 Fill with correct fuel mixture and bar oil before starting and keep fuel in properly labeled safety cans stored away from any ignition sources.

7.3.2 Move away from the fueling spot to start the saw.

7.3.3 Place the saw on the ground - make sure the bar and chain are in the clear - hold the saw down with your hand on the handle and one foot in the rear handle (if it will fit).

Start the saw using the manufacturer's recommendations. (Note: Always start saw with the chain brake on. Drop or Throw starting is not allowed.)

- 7.3.4 Check chain brake for proper operation.
- 7.3.5 Saws should be adjusted so that the chain will not turn when at idle.
- 7.3.6 Always allow the saw to cool somewhat before refueling - watch out for the hot muffler. Refuel down wind and well away from burning brush and other sources of ignition.

7.4 Training and Operating

Chain saw operators must be able to demonstrate to his/her immediate supervisor experience and full knowledge of all aspects of this Safety Policy and Procedure. On the job training can be substituted for experience providing close supervision is maintained.

- 7.4.1 Never work alone. A chain saw user must always be in sight of other workers.
- 7.4.2 Keep the work area orderly to avoid tripping hazards.
- 7.4.3 Keep both hands on the saw and do not extend the saw to arm's length or work over shoulder height.
- 7.4.4 Maintain good control of your saw at all times, avoiding off balance positions.
- 7.4.5 Check wood, especially used lumber, for wire, bolts, nails and other hazards. These can cause kickback.
- 7.4.6 Always keep the tip of the chain bar clear of the work, the ground and other obstructions to avoid kickback. If equipped, keep tip guard in place.
- 7.4.7 Shut the saw off when carrying and before setting saw down.
- 7.4.8 Keep chain properly tightened.
- 7.4.9 It is a good idea to use scabbard or a similar cover when not actually using a saw.
- 7.4.10 NEVER leave a saw unattended on the ground in an area where mobile equipment is operating.
- 7.4.11 Guard against saw kickback by standing comfortably off center, maintain good footing and a grip on the saw.
- 7.4.12 When cutting a stack of lumber, ensure that the chain bar tip extends a few inches beyond the stacked lumber to avoid a kickback.
- 7.4.13 Using a chain saw is tiring, especially for the inexperienced. Do not work to the point where you are not in complete control of your saw.

7.5 Felling and Clearing

- 7.5.1 Team members should be assigned so that no one is less than two tree lengths away from anyone cutting trees.
- 7.5.2 The cutting area should be surveyed for dead or broken tops, hanging limbs or standing dead trees.
- 7.5.3 Undergrowth must be cleared and plan a path of retreat before starting a cut.
- 7.5.4 Notch and back cuts should be used on all but the smallest trees.

- 7.5.5 Use wedges as necessary to control tree fall or to keep from pinching a saw. Wedges should be standard equipment available when cutting trees.
- 7.5.6 If equipment is used to control tree fall, make sure plenty of cable is used in order to keep a safe distance from the falling tree.
- 7.5.7 Take extra care to control the fall of trees located in close proximity to housing, power lines, roadways, etc. Contact the power company if it's necessary to disconnect power lines.
- 7.5.8 When a tree starts to fall, shut off the saw and retreat to a safe location (at an angle away from the line of fall).
- 7.5.9 Lodged trees should be pulled down before cutting other trees in the area.
- 7.5.10 When limbing, beware of limbs or other small trees that are bent and are under extreme tension.
- 7.5.11 When working on sloping ground, try to limb and buck from the uphill side of the trunk. Always remember that a trunk may roll quickly, even on flat ground when supporting limbs are cut.

7.6 Aerial Operations

- Cold start (warm-up) chainsaws on the ground for ease of starting at elevations.
- Shut chainsaws off when repositioning basket.
- If climbing poles, shut chainsaws off when re-positioning.
- Place scabbard on chainsaw when not in use (pole trucks should be equipped with scabbards mounted outside the bucket. See TreeStuff.com).
- Do not lean out of the basket. Re-position instead.
- Position basket and yourself out of the line of fire and clear of flying debris.
- Both hooks must be planted in pole during chainsaw operations.
- Use ground spotters visible to the operator and lines of demarcation to keep TM's out of Drop Zones.
- The operation of a chainsaw from any ladder is prohibited.

8 Budget / Approval Process

8.1 Not Applicable

9 Related Documents

9.1 Not Applicable.

Policy Number: 014**Authorized By:** Michael W. Bennett**Title:** Exposure to Heat and Cold**Effective Date:** 04/18/94Page 1 of 8

1 Status

- 1.1 Update of existing policy, effective 05/06/14.

2 Purpose

- 2.1 Cianbro work environments often include team member exposure to adverse temperature conditions. Exposure to heat and cold extremes can be disastrous. Heat stress and frostbite are serious business and require prior planning and hazard elimination. This policy is designed to help you identify and prevent extreme body temperature changes.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Acclimatization: The process of adjusting to a chronic change in the environment.
- 4.2 Apparent Temperature: A measure of relative discomfort due to combined heat and high humidity.
- 4.3 Papule: A solid and usually small elevation of the skin. They often occur in clusters and can accompany rashes.

5 Policy

- 5.1 Prior to any work in hot or cold environments a hazard analysis will be developed in our daily activity plan for these extreme life threatening conditions. The plan must meet the requirements contained within this policy.

6 Responsibilities

- 6.1 Corporate Safety is responsible for maintaining this document.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.

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7.1 Heat Stress Emergencies

7.1.1 The best thing about heat stress is that it can be prevented. All it takes is a little education and effort. Whether it is on hot, humid days with no breeze, warm inside working areas, or in confined spaces, anyone can be affected by the heat. When you anticipate heat stress to be a factor, have team members complete the heat stress medical questionnaire SD1072 available out on Cianbro.net>Standard Operating Procedures - on the SOP. The questionnaire and heat acclimatization schedules are available out on Cianbro.net. The questions take very little time to answer, are easy to complete and will provide you with information to help you know what to look out for and what to do for individual team members. Some tips to help you avoid heat emergencies are as follows:

- Address heat stress in the activity plan.
- For apparent temperatures of 95°F or above specified mandatory breaks are required.
- Train team members to recognize the symptoms of a heat illness and what to do if they experience any of the symptoms.
- Select light colored clothing and cover as many exposed areas as possible.
- Wear a ventilated hat whenever possible. Cianbro hard hats are designed to allow circulation underneath.
- Drink at least 1-2 cups of water every 20 minutes and stay away from alcoholic/caffeinated beverages and salt tablets. Carbohydrate-electrolyte beverages such as Gatorade or Sqwincher can be used.
- Keep in good physical condition and maintain a reasonable diet (avoid eating large or heavy meals before or during work) if heat stress is a concern.
- If you begin to feel faint, Stop! Rest in a cool place out of the sun. If possible, limit activities that are in direct sunlight.
- Look at creative ways to cool work area such as fans, tarps for shade, PAPR's, etc.
- If you choose to lie in the sun or need to work in the sun, be sure to wear a sunscreen and limit your exposure time. Don't forget to reapply as directed by the manufacturer.
- Use general ventilation to dilute hot air with cooler air (generally cooler air that is brought in from the outside). Portable or local exhaust systems may be more effective or practical in smaller areas.
- Increase airflow using fans. Changes in airflow can help team members stay cooler because it will increase the exchange of heat between the skin surface and the surrounding air. Do not use this method if temperatures exceed 95°F and the relative humidity is 100%: increasing airflow under these conditions will increase risk of heat stress.
- Shielding can be used to reduce radiant heat. Polished surfaces make the best barriers, although special glass or metal mesh surfaces can be used if visibility is a problem. The surface of the shield should be kept clean to maintain its effectiveness.

7.1.2 Heat Stroke

Heat stroke is life threatening. The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can rise so high that brain damage or death may result if the body is not cooled quickly.

Signs and Symptoms - any one or combination of the following:

- Oral temperature above 103⁰
- Severe headache
- Irrational behavior, confusion
- Fast, shallow breathing
- Red, hot, dry skin
- Fast, weak pulse
- Vomiting
- No sweating
- Dilated pupils

Treatment:

- Call for medical assistance immediately
- Move the person to a cool place
- Have the person lie down with feet slightly elevated (8 to 12 inches)
- Loosen tight clothing
- Remove perspiration-soaked clothing
- Apply cool wet towels to the skin
- Fan the person
- If the person is conscious, give SMALL (4 oz. every 15 minutes) amounts of cool water to drink

Note: If the person refuses water, vomits or starts to lose consciousness

- Place the person on their side
- Continue to cool the person by using ice or cold packs on their wrists, ankles, groin and neck and in their armpits.

Regardless of team member's protests, no team member suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

7.1.3 Heat Exhaustion

Heat exhaustion is less dangerous than heat stroke. It typically occurs when people exercise heavily or work in a warm, humid place where body fluids are lost through heavy sweating.

Signs and Symptoms - any one or combination of the following:

- Cool, moist, pale, grayish or red skin
- Heavy sweating
- Dilated pupils
- Headache
- Nausea
- Dizziness, weakness and exhaustion

Treatment:

Follow same procedures as listed for heat stroke. Without prompt care, heat exhaustion can quickly become heat stroke.

7.1.4 Heat Cramps

Heat cramps generally result from the loss of body fluid and salt from heavy sweating that creates an electrolyte imbalance.

Signs and Symptoms:

- Spasms or muscular pains usually in the abdomen or legs.

Treatment:

- Move the person to a cooler place and give small amounts of water.
- Lightly stretch, gently massage the cramped area.

7.1.5 Heat Rash (Prickly Heat)
Heat rashes are the most common problem in hot work environments.

Signs and Symptoms:

- Red pimples/papules

Treatment:

- Wear loose clothing to help prevent it.
- Change damp clothing immediately.
- Use drying lotions on areas to prevent infection. Once the individual returns to a cool environment, heat rashes will eventually disappear.

7.1.6 Heat Fatigue

Signs and Symptoms:

- Impaired performance
- Irritable
- Impaired mental performance

Treatment:

- Remove person to cooler place
- Frequent rest time in cool, shaded area
- Increase water intake

7.2 Worker Monitoring Programs

Personnel monitoring can be done by checking the heart rate, recovery heart rate, oral temperature, or extent of body fluid loss. Any one of the following team member monitoring programs can be implemented on a job site where there is a potential for heat illnesses to develop. See the heat stress medical questionnaire SD1072 available out on Cianbro.net>Standard Operating Procedures - on the SOP

Checking Heart Rate: To check the heart rate, count the radial pulse (located on your wrist) for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period.

Recovery Heart Rate: The recovery heart rate can be checked by comparing the pulse rate taken at 30 seconds (P_1) with the pulse rate taken at 2.5 minutes (P_3) after the rest break starts. These two pulse rates can be interpreted using Table 1- Heat Rate Recovery Criteria. Please see 9.1 Appendix A for further information.

7.3 Cold Emergencies

On days with low temperatures, high winds, and humidity anyone can suffer from the extreme cold especially if they are wet. Severe cold exposure can be life threatening. Some tips that can help avoid cold related emergencies are as follows:

- Wear quality multi-layered clothing as opposed to one heavy garment.
- Wear dry clothing.
- Avoid alcoholic beverages - consumption of alcohol increases the chances of hypothermia.
- Select quality footwear - footwear should not be tight - wear thin layers of socks.
- Look at creative ways to warm the work area such as tarps to reduce wind, enclosed-ventilated area heaters, etc. Stay away from open flames such as burn barrels, etc.

7.3.1 Hypothermia

Hypothermia is life threatening. It occurs when the entire body cools because its ability to keep warm fails. If not caught early, the victim gradually becomes clumsy and has trouble holding things. If left too long, the victim experiences a decreasing pulse and breathing rate. The team member will die if care is not given.

Signs and Symptoms:

- Shivering
- Dizziness
- Numbness
- Confusion

- Glassy Stare
- Weakness
- Impaired Judgment
- Impaired Vision
- Drowsiness
- Loss of Consciousness

Treatment:

- Gently move the person to a warm place.
- Monitor airway, breathing and circulation.
- Remove any wet clothing and dry the person.
- Warm the person by wrapping him or her in blankets or by putting on dry clothing (passive rewarming).
- If the person is alert/ fully conscious, give him or her warm liquids to drink that do not contain alcohol or caffeine.
- Hot water bottles or chemical hot packs may be used when they are wrapped in a towel or blanket before applying.
- Warm up their body slowly. Do not warm the person too quickly, such as by immersing them in warm water. Rapid warming may cause dangerous heart rhythms.
- Give CPR if needed.

7.3.2 Frostbite

Frostbite is the most common cold related injury. Ice crystals form within the tissues of the body and most commonly affect the ears, nose, chin, cheeks, fingers and toes. The ice crystals restrict blood flow to the affected area. Frostbite can lead to loss of fingers, hands, arms, toes, feet and even legs.

Signs and Symptoms:

- Lack of feeling in the affected area
- Skin slightly flushed and appears waxy
- Skin color changes to white, grayish yellow or grayish blue
- Painful in early stages, becomes numb in later stages
- Frostbitten part feels cold to the touch
- Large blisters may form

Treatment:

- Bring the victim indoors if possible
- Handle the area gently; DO NOT rub the frostbitten area
- Cover the affected area with dry extra clothing/blankets or loosely bandage with dry, sterile gauze
- If possible, re-warm the frostbitten area by immersing it in lukewarm water -- DO NOT USE HOT WATER! Do not allow frostbitten area to touch the container.
- If the person's fingers or toes are frostbitten, place dry, sterile gauze between them to keep them separated
- If blisters develop, avoid breaking them
- Seek medical attention immediately

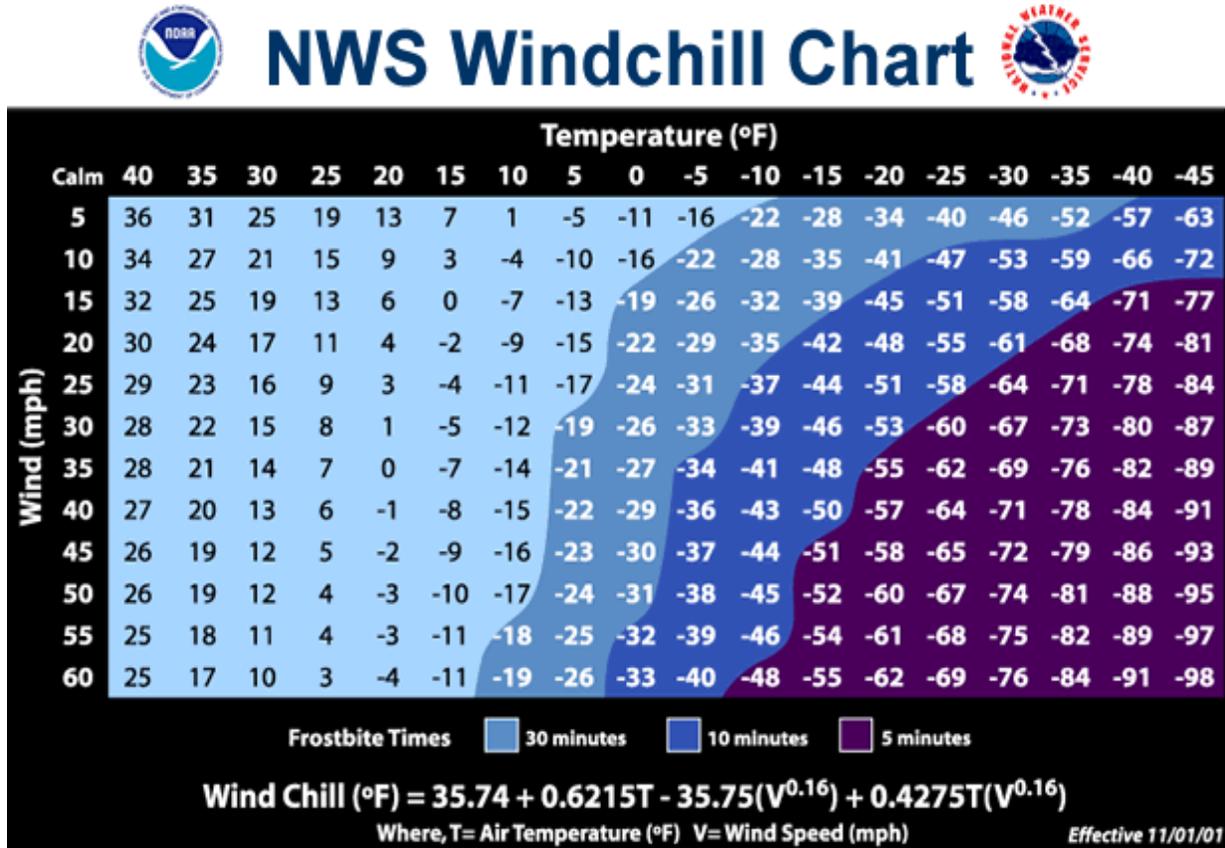
7.4 Wind Chill

Wind chill gets its name from the combined effect of cold temperature and wind. How does this happen? Well, the wind strips a layer of relatively warm air that forms just above the surface of your skin (which heats this layer of air). The faster the wind, the greater the loss of this "warm" air (there is a limit though – wind speeds in excess of 60 mph have very little additional effect on this process).

A wind chill chart was developed in Antarctica during the early 1940s. While care should be exercised whenever the wind chill temperature is below 32°F, the concern magnifies when the chill dips below 0°F. Frostbite can occur with a wind chill temperature below - 30°F. There is one thing to keep in mind. The wind chill chart should be considered a guideline because it does not account for the individual's metabolism, state of nourishment and alcoholic

consumption-all of which affect the body's rate of heat loss. Exercise increases your metabolism and may help you keep warm during a windy, cold day. However, if your exercise involves skiing 30 mph down the side of a mountain, then your body's motion is creating its own additional wind chill. Skiers should use extra caution and protect all exposed skin.

Wind Chill Table



7.5 Summary

Exposure to heat and cold extremes can be disastrous. However, by utilizing basic hazard elimination skills and training team members to recognize the warning signs not only in themselves but others, work can be performed injury free.

**Some information used in this safety policy and procedure was taken from the American Red Cross Workplace First Aid workbook.

8 Budget / Approval Process

8.1 Not Applicable

9 Related Documents

9.1 See attachments

9.2 Documents available on Cianbro.net>Standard Operating Procedures - on the SOP

Heat Stress Medical Questionnaire & Analysis	SD1072
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Heart Rate Recovery Criteria

<u>Heart Rate Recovery Pattern</u>	<u>P₃</u>	<u>Difference Between P₁ and P₃</u>
1. Satisfactory Recovery	<90	
2. High Recovery (Conditions require further study)	>90	<10
3. No Recovery (May indicate too much stress)	>90	>10

Oral Temperature: Oral temperature can be checked with a clinical thermometer after work but before the team member drinks anything. If the oral temperature taken under the tongue exceeds 99.6°F, shorten the next work cycle by one-third.

Body Fluid Loss: Body fluid loss can be measured by weighing the worker on a scale at the beginning and end of each workday. The time weighed in and out should be the same each day. The worker's weight loss should not exceed 1.5% of total body weight in a workday. If a weight loss exceeding this amount is observed, fluid intake should increase and person should not be placed into a hot environment until the percentage decreases below 1.5.

Heat Index Environmental Temperature (°F)

Environmental Temperature (°F)											
	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°
Relative Humidity	Apparent Temperature										
0%	64°	69°	73°	78°	83°	87°	91°	95°	99°	103°	107°
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	130
30%	67	73	78	84	90	96	104	113	123	135	148
40%	68	74	79	86	93	101	110	123	137	151	
50%	69	75	81	88	96	107	120	135	150		
60%	70	76	82	90	100	114	132	149			
70%	70	77	85	93	106	124	144				
80%	71	78	86	97	113	136	157				
90%	71	79	88	102	122	150	170				
100%	72	80	91	108	133	166					

Apparent Temperature

Heat Stress Risk with Physical Activity and/or Prolonged Exposure

90° - 100°

Heat cramps or heat exhaustion possible.

101°-129°

Heat cramps or heat exhaustion is likely. Heat stroke is possible.

130° and up

Heat stroke is highly likely.

Policy Number 015**Authorized By:** Michael W. Bennett**Title:** Welding and Cutting Hazard Assessment Program **Effective Date:** 09/16/95Page 1 of 12

1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 To provide guidelines and requirements to protect team members from the hazards associated with welding, cutting, and burning operations.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Adequate Ventilation: Used in this policy means any of the following: Local exhaust ventilation is used to capture fumes or in open area with adequate air movement or adequate dilution ventilation with directional air flow away from team member.
- 4.2 Air Arc (Carbon Arc): A cutting process by which metals are melted by the heat of an arc using a carbon electrode. Molten metal is forced away from the cut by a blast of forced air.
- 4.3 Bug-O BUG-O Systems Inc.: A manufacturer of a system of drives, carriages, rails and attachments designed to automate welding guns, cutting torches and other hand held tools.
- 4.4 Cad Welding: An exothermic (gives off heat) welding process that fuses conductors together to form a molecular bond with a current-carrying capacity equal to that of the conductor. Typically used in grounding systems.
- 4.5 Downdraft Table: A downdraft table is a work station for welding (or grinding and cutting) that provides a ventilated table to work on top of. The air and contaminant is drawn down through the table and away from the worker.
- 4.6 Flux: A substance which facilitates welding (and soldering and brazing) by chemically cleaning the metals to be joined. The primary purpose of flux in welding is to prevent oxidation of the base and filler materials. Note: Flux typically contains fluorides.
- 4.7 Flux Core Arc Welding (FCAW): An arc welding process which melts and joins metals by heating them with an arc between a continuous, consumable electrode wire and the work. Shielding is obtained from a flux contained within the electrode core. Added shielding may or may not be provided from externally supplied gas or gas mixture.
- 4.8 Gas Metal Arc Welding (GMAW) MIG: (also referred to as solid wire welding) Arc welding process which joins metals by heating them with an arc. The arc is between a continuously fed filler metal (consumable) electrode and the workpiece. Externally supplied gas or gas mixtures provide shielding.
- 4.9 Inadequate Ventilation: As used in this policy means local exhaust ventilation is not being used or work is inside enclosed spaces with inadequate air movement or any other location with

inadequate air movement or the air movement draws the contaminants through breathing zone of the team member.

- 4.10 Lance Rod: Thermal lance rod is a cutting tool that utilizes ignited iron (or aluminum or magnesium) fed with a stream of pressurized oxygen. A steel tube packed with steel rods (and aluminum or magnesium) is connected to a valved handle assembly fed by an oxygen line and tank. An intensely hot (6k - 10 k degrees Fahrenheit) oxy/steel fueled jet is created at the tip.
- 4.11 The National Institute for Occupational Safety and Health (NIOSH): Federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services. It is essentially the research arm of OSHA and is responsible for approving respirators.
- 4.12 Oxy-Fuel Cutting: A mixture of oxygen and the fuel gas is used to preheat the metal to its 'ignition' temperature which, for steel, is 700°C - 900°C (bright red heat) but well below its melting point. A jet of pure oxygen is then directed into the preheated area instigating a vigorous exothermic chemical reaction between the oxygen and the metal to form iron oxide or slag. The oxygen jet blows away the slag enabling the jet to pierce through the material and continue to cut through the material. Typical fuel gases used are acetylene, propane, MAPP (methylacetylene-propadiene), and propylene.
- 4.13 Plasma Cutting: Arc cutting process which severs metal by using a constricted arc to melt a small area of the work. This process can cut all metals that conduct electricity.
- 4.14 Shielded Metal Arc Welding (SMAW) or (Stick Welding): Arc welding process which melts and joins metals by heating them with an arc, between a covered metal electrode and the work. Shielding gas is obtained from the electrode outer coating, often called flux. Filler metal is primarily obtained from the electrode core.
- 4.15 Sub-Arc Submerged Arc Welding: A process by which metals are joined by an arc or arcs between a bare metal electrode or electrodes and the work. Shielding is supplied by a granular, fusible material usually brought to the work from a flux hopper.
- 4.16 Threshold Limit Values TLV® (TLVs): Guidelines, not standards prepared by the American Conference of Governmental Industrial Hygienists, Inc (ACGIH) to assist industrial hygienists in making decisions regarding safe levels of exposure to various hazards found in the workplace. A TLV® reflects the level of airborne exposure that the typical worker can experience without an unreasonable risk of disease or injury. Cianbro uses the TLV in situations where it is more protective than the OSHA PEL. *Some definitions obtained from the Miller Electric Manufacturing Co. website*
- 4.17 Tungsten Inert-Gas Welding (TIG) or Gas Tungsten Arc Welding (GTAW) (HELIARC): Joins metals by heating them with a tungsten electrode which should not become part of the completed weld. Filler metal is sometimes used and argon inert gas or inert gas mixtures are used for shielding.

5 Policy

- 5.1 Adequate ventilation is required during welding and cutting operations. If adequate ventilation is not provided then respiratory protection is required.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.
- 6.2 Corporate Safety is responsible for maintaining this document.

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7.1 Health Effects

Welding, burning, and cutting produce metal fumes and gases that can be hazardous to your health. Breathing in these fumes and gases can and does make people sick. Luckily, a healthy body clears most toxic substances including welding fumes. Still, you can be exposed to too much of any fume or have a medical problem that makes you more likely to get sick from exposure to welding and cutting fumes. The length of time that you are exposed to these gases and fumes, the type of hot work you do, the work environment, and the protection you use determine the risks to your health and how you will be affected.

Like most other toxic substances, welding and cutting fumes have “acute” effects that may occur as soon as or shortly after you are exposed. Acute effects can include headache, cough, shortness of breath, eye irritation, or metal fume fever. Welding and cutting fumes also have “chronic” effects that may not be noticed for years. These effects may include lung, kidney, bone or joint disease and even cancer. Most acute effects are caused by brief overexposures. These effects almost always go away within a day or two and don’t cause any permanent damage. Chronic effects from lower exposures over longer periods of time, like lung disease or cancer, are more serious and can sneak up on you before you know it. Any time you think you are having any unexplained symptoms or effects, let your safety specialist know as soon as possible.

Pay attention to what you weld or cut, where you are welding or cutting, and which process you are using. Be sure to provide for appropriate ventilation and use all required PPE. Remember, the best “treatment” for any toxic exposure is prevention!

7.2 Pre-Job Welding and Cutting Hazard Evaluation

Before starting any task that involves welding, cutting and burning a pre-task hazard analysis is required. This should be done as part of the activity planning process and will include both health hazards and physical hazards (see section 7.6). Once the hazards are identified, appropriate engineering and administrative controls and personal protective equipment (PPE) can be selected to keep team member exposure to as low as reasonably practicable. When doing a hazard evaluation, make sure to include surrounding workers that could also have exposure and make provisions to protect them as well. Special precautions and planning are required when welding, cutting or heating on hollow metal. Containers and structures to ensure flammable or combustibles are not present. If welding cannot be conducted safely, the welding and cutting shall not be performed.

The following four factors need to be considered:

What base metals are being worked on?

Base Metal	Contaminant Generated
Carbon (Mild) Steel	Iron oxide, manganese
Stainless Steel	Iron oxide, hexavalent chromium, nickel, ozone gas, manganese
Galvanized	Iron oxide, zinc oxide, manganese
Aluminum	Aluminum, ozone
Exotic metals	Beryllium, titanium (examples)

Iron, Zinc, Aluminum – have relatively high exposure limits. If welding outdoors, natural ventilation and limiting actual welding time during the day should suffice for controlling exposures. For indoor welding or confined spaces, available mechanical or natural ventilation will need to be reviewed on a case-by-case basis along with daily duration of welding. If respirators are required, any “100” efficiency particulate respirator should be adequate (assuming sufficient oxygen is present).

Chromium, Nickel, Cadmium - are suspect human carcinogens, have very low recommended exposure limits and therefore will require more careful planning in regards to ventilation. There is a new OSHA standard for Hexavalent chromium with a very low permissible exposure limit (5.0 ug/m3). Limiting the amount of welding time per day is not allowed as a control option for cadmium or chromium. If respirators are required, “100” efficiency respirators and possibly air supplied respirators should be used. See 29CFR1926.1127 for cadmium specific regulations and 29CFR1926.1126 the hexavalent chromium standard.

Note: Working with stainless steel is much more dangerous than working with galvanized steel because the hexavalent chromium and nickel in stainless have serious long term health effects while the zinc from galvanized causes metal fume fever but has no known long term health effects.

Manganese - Manganese is a highly reactive gray-white metal resembling iron, and adding manganese to steel increases its hardness, stiffness and strength. Manganese is a major component of welding fumes, particularly those from mild steel welds using shielded metal arc welding (SMAW). Mild steel is the most common steel used in industry, and SMAW is the most common type of commercial welding, but manganese exposures can result from other types of welding as well.

Exotic Metals - contact Safety Department for consultation.

7.2.1 What type of welding process is being used?

Welding Process	Contaminant Generated
Flame cutting	Carbon monoxide, oxides of nitrogen
Gas metal arc welding (MIG)	UV radiation, ozone, CO if CO2 gas is used, low oxygen, manganese
Gas tungsten arc welding (heli-arc or TIG)	UV radiation, ozone, oxides of nitrogen
Plasma cutting	Ozone, oxides of nitrogen, noise, low oxygen
Carbon arc (air arc) cutting	Noise, iron oxide, copper
Flux cored arc welding	Barium, iron oxide, aluminum, magnesium
Shielded metal arc welding (stick)	UV radiation, fluorides, manganese
Cad Welding	Copper oxide, aluminum, fluorides, heat (exothermic reaction)
Lance rod cutting	Magnesium or Aluminum oxides, O2 enrichment

Ozone, Oxides of nitrogen are irritating to the eyes, nose and throat. Excessive exposure may cause pulmonary edema (fluid in the lungs) that can lead to heart failure. Ventilation is the only way to feasibly control both gases. Respirators (except air line) are not an option. Reducing the welding arc amperage to the lowest level that still allows an acceptable product will help reduce ozone levels and welding fume in general. Arc welding, especially on stainless steel, aluminum and when using argon gas tends to generate the most UV radiation and therefore the most ozone.

Noise - Exposure to excessive noise may cause noise induced hearing loss. All welding operations should be reviewed for noise exposure. Plasma arc, arc air gouging, and metal spraying will almost always require use of hearing protection devices.

Low oxygen - Oxygen deficiency (less than 19.5%) is possible whenever gas shields are use in confined spaces, or areas with poor ventilation. Note: Improper use of oxygen in a confined space can produce an oxygen-enriched atmosphere - a serious fire and explosion hazard.

Oxygen Enrichment – Oxygen present at levels higher than 21% makes flammable and combustible materials burn violently when ignited.

Aluminum, magnesium, and copper fume – may cause metal fume fever and irritation of the respiratory tract. Aluminum and magnesium have relatively high exposure limits while copper fume has a relatively low exposure limit of 0.2 mg/m³.

UV Radiation - See Section 7.6

7.2.2 What is in the welding rod or filler rod being used?
MSDS must be reviewed to determine what components (e.g. filler metals, fluxes) may be in the welding rod being used. Hazards and controls will vary with the specific rod used. Some rods will be copper coated (e.g. gas metal arc). Excessive exposure to copper may cause metal fume fever. Other rods contain manganese. Fluoride fluxes may cause irritation to the eyes, nose and throat.

7.2.3 Are there any coatings or cleaning solvents residue on the object to be welded?

Coating or Solvent	Contaminant
Paint primers or coatings	Lead, Cadmium, Zinc, Hexavalent Chromium (lead chromates, zinc chromates)
Plating or corrosion protection	Cadmium
Polyurethanes, isocyanate based paints	Variety of organic pollutants (e.g. diisocyanates)
Marine coatings, anti-fouling	Mercury, tin
Chlorinated solvents	Decomposition products (e.g. phosgene gas)
Anti-spatter (may contain chlorinated solvents)	Refer to MSDS
Residue from previous contents	Varies, refer to MSDS

Note: Preferred control method is to remove coating or solvent prior to welding.

Lead, Cadmium and Chromium - For lead see Cianbro's Workplace Lead and Other Heavy Metals Safety Policy and Procedure and 29CFR1926.62 for lead specific regulations. For hexavalent chromium see 29CFR1926.1126 and for cadmium see 29CFR1926.1127. Cadmium plating on bolts and nuts is common in high corrosion areas.

Chlorinated solvents (e.g. trichloroethylene, perchloroethylene) - Chlorinated decomposition products (e.g. phosgene) especially common with high UV producing welding.

Isocyanates, polyurethane coatings - Numerous materials can be generated depending on the situation. Even at low concentrations, many of them are extremely irritating. These materials can also be sensitizers. Always refer to MSDS.

Mercury - Low Permissible Exposure Limit. Excessive exposure may cause tremors, headache, and weakness. Respirators with mercury specific filter or mechanical ventilation will probably be required. May be absorbed through intact skin.

Anti-spatter compounds - May contain chlorinated solvents.

Residue from previous contents - Know what material was present in the tank or line before beginning hot work. Refer to the MSDS.

If caustic was present, it may leave traces of mercury in the metal due to the process used to manufacture the caustic.

Paper mill stock lines may contain hydrogen due to anaerobic bacteria called Clostridia: There have been several reported cases of explosions in the literature attributed to hydrogen. The anaerobic condition required is most likely to be present during shutdown conditions. Ventilation of stock lines and tanks can control this hazard. Hydrogen may show up as a reading of carbon monoxide and LEL on a multigas monitor. It can be tested for using colorimetric (detector) tubes.

7.3 Engineering and Administrative Controls

7.3.1 Once the hazards are identified, determine what controls will reduce or eliminate the risks. The most effective way to protect you from the hazards associated with hot work is to substitute less hazardous materials or methods, make physical changes in the work environment, and use administrative controls (safe work practices). Below are some engineering and administrative controls that should be considered for each task.

- Spec areas to be welded on new material to be left bare of coatings.
- Spec bolt-up connections rather than welds.
- Use mechanically guided welding processes (e.g. Bug-O) so welder can stay back away from the plume.
- Use welding guns that capture the fume. These units are highly recommended for all work using wire feeders. They control the contaminants at the point of generation.
- Use general ventilation (air movers to blow or exhaust the fumes away from you) making sure the fumes are not drawn through your breathing zone or exposing other workers. As a rule of thumb, visible welding fume should clear within 30 seconds of the welding stopping or it is probably not adequate.
- Use local exhaust ventilation positioned 4"-6" from the work to remove fumes and gases at their source. This is the most effective form of ventilation and should be used whenever possible, especially in fab areas and fixed locations.
- Stay out of the plume! Make sure you position yourself so the plume does not pass through your breathing zone. Also, pay attention to other welders as they may not even realize that they are in the plume.
- Move the work into open areas if possible. Do not work in confined or enclosed spaces if it is not necessary.
- Use mechanical means rather than hot work (sawcut grating rather than burning to size or rivet bust rather than burn rivets off, etc.). There is a circular saw available that cuts grating, angle, pipe, etc. up to 2 inches thick as easily as cutting plywood.
- Limit the length of time you weld during a shift. Sampling results should be used to determine safe lengths of time to weld.
- Use long-handled torches.
- Remove all coatings and residues from the pieces to be welded. For paint and other preservative coatings remove at least 4 inches back from the point of heat generation. Far enough back that the operation does not raise the temperature of the coating appreciably.
- Use less hazardous flux materials if process allows.
- Use the safest welding method for the job (e.g. Stick welding makes less fume than flux core welding but may take longer).
- Use low fume rods if process allows.
- Use downdraft tables to weld small pieces on.
- Know what materials and hazards you are dealing with. Refer to MSDS for the electrodes, base metals, and coatings.

7.3.2 Is the Ventilation Adequate or Poor?

Adequate Ventilation: The following situations would be considered adequate ventilation.

- Local exhaust ventilation is used to capture fumes (must be positioned within one to two duct diameters of the work) or
- Work is in an open area with adequate air movement or
- There is adequate dilution ventilation with directional airflow away from team member (the fume cannot be drawn through the team member's breathing zone) or
- Fume capture guns are used.

Poor Ventilation: The following situations would be considered poor ventilation.

- Local exhaust ventilation is not used and
- The work is inside enclosed spaces with poor air movement or
- The air movement draws the contaminant(s) through the breathing zone of the team member.

If you are not sure if you have an adequate or a poor ventilation situation, then consider it poor ventilation. If adequate ventilation can not be provided, respirators are required.

7.4 Respiratory Protection

If adequate ventilation cannot be provided, all jobs will require a respirator until air sampling proves otherwise! If a respirator is required you must follow the requirements of 29CFR1910.134 and Cianbro's Respiratory Protection Program Safety Policy and Procedure. Respirators are a last resort and should be used only when feasible engineering and administrative controls are not enough. Refer to Appendix A of this Safety Policy and Procedure for minimum respiratory protection requirements for the most common hot work activities. Respiratory protection is almost always required when welding in a confined space.

7.5 Exposure Monitoring

OSHA has limits for exposure to the metals, gases, and fumes during welding. However some of these limits are out of date and may not protect you enough. Other more protective published limits may be used like the ACGIH Threshold Limit Values. These more protective suggested limits should be used in most cases to better protect the health of our team members. NIOSH has reported that the levels of sickness and death are higher than expected in welders, even when the exposures are below the current OSHA PEL's for the many individual components of welding emissions. NIOSH also says welding fumes may cause cancer. Therefore it is very important to keep exposure to welding fumes as low as possible.

When deciding what to sample or monitor for the safety specialist needs to be involved and will use the information obtained in the pre-job hazard evaluation required in Section 7.2 of this Safety Policy and Procedure. Sampling is the only way to know whether or not our team members are being protected from the airborne hazards associated with the welding process.

7.5.1 Metals

The metals will be sampled using the same procedure as for lead and multiple metal contaminants can be tested from a single sample. Typical sampling would include manganese for mild steel and hexavalent chromium for stainless steel. Hexavalent chromium requires a different type of filter than the other metals. Sample should be positioned on the welder's collar so that it is underneath the welding hood as close to the welders breathing zone as possible. Contact the Manager of Health and Environmental Hazards, the Scott Lawson Group, Travelers Laboratory, or other approved laboratory when sampling for a metal contaminant you have not sampled for previously. Reference Appendix B for exposure limits.

7.5.2 Gases

Gases can usually be monitored using direct reading instruments such as multi-gas monitors and detector tubes. These should be used to determine if ventilation and other controls are adequate and to determine if further monitoring should be done. To determine actual team member exposure however, personal air sampling needs to be done using either passive monitors or a sample pump and appropriate collection media such as cassettes or charcoal tubes. Contact the Manager of Health and Environmental Hazards, the Scott Lawson Group, Travelers Laboratory, or other approved laboratory to obtain the correct sampling media and method. Reference Appendix C for exposure limits.

7.6 Medical Surveillance

Any team member who performs welding or cutting for Cianbro is required to fill out the welding and cutting section of the periodic medical questionnaire. Cianbro's Medical Director will use this information along with other information (like the PFT results every third year) to determine the need for a welding physical and/or other medical testing. Reference the welding/cutting portion of the periodic medical questionnaire in Appendix B. If there are any symptoms possibly caused by exposure to welding processes report it to your supervisor and safety specialist. Symptoms can be very similar to many other types of illnesses so it is important to report them. The job site will contact Occupational Medical Consulting as soon as possible to help determine the proper care and to recommend specialty evaluation. Cianbro's Medical Director will make recommendations for medical removal from the welding environmental, PPE, and other actions to reduce ill effects from exposure as necessary.

7.7 Training

Team members who perform welding or operate and maintain oxygen/fuel gas equipment for Cianbro must be trained initially and annually in the contents of this Safety Policy and Procedure and the content of applicable OSHA standards. Team members in charge of oxygen/fuel gas supply equipment must be trained and deemed competent to do so. In addition, the OSHA Hazard Communication standard 29CFR 1926.59 requires team members to be trained in the hazards of the materials that they may come into contact with. To meet this requirement, the results of the pre-job welding and cutting hazard assessment must be covered with the crew as part of the activity plan review.

7.8 Physical Hazards

7.8.1 Radiation – arc welding produces three types of radiation:

- UV radiation burns exposed skin much like a sunburn and affects the cornea of the eye which causes “flashburn” that feels like sand in the eye.
- Visible radiation produces an intense light from the arc that can damage the retina of the eye.
- IR radiation generates intense heat that can cause burns when sparks and spatter fly off the welding process or hot metal and sparks blow out from the cutting process. Burns can also occur when touching hot work pieces or equipment.

For eye protection, use lens shade as recommended by OSHA 29CFR1926.102 Table E-2. Welding helmets are considered secondary eye protection and must be used with primary protection (e.g. safety glasses side shields and UV protection). Other workers in the area need to be protected as well using welding screens and UV protective safety glasses.

For skin protection use personal protective equipment, welding gloves, shirts with long sleeves, welding leathers, coveralls or aprons. Clothing should be of fire resistant material like wool, heavy tight weave cotton or Nomex®. No pockets or cuffs. Avoid synthetic materials, as many are extremely flammable. Fire resistant shoulder covers, head covers, ear covers are needed for overhead work. Sunscreen (SPF 15 or higher) should be used on all exposed skin.

7.8.2 Electrical Shock

Inadequate grounding of equipment, worn or damaged leads, lack of proper gloves and working in wet conditions can lead to electrical shock. Electrical shock from welding and cutting equipment can kill, cause severe burns, or result in serious injury from falls caused by the shock. Equipment and sometimes the work piece should be grounded. Use a separate connection to ground the equipment or work piece to the earth. Clothes and work surfaces should be dry. If the work area is wet you must eliminate the hazard by moving out of the wet area, protecting from dripping, raising the work up out of the wet, etc.

- 7.8.3 Fire and explosion can result from welding or cutting close to combustible materials, from leakage of welding or cutting gases through poorly fitting or leaking hoses, from vapors given off by flammable liquids too close to the work (the vapors can travel until they encounter a source of ignition and then flash back), from welding on tanks or containers that have held flammable or combustible materials. To reduce the risk from fire and explosive wear flame retardant clothing (gauntlet gloves, wool or tight weave cotton or leather long sleeved shirt, coveralls without cuffs), inspect the work area and remove or protect all combustibles prior to starting, use a trained fire watch, have appropriate extinguishing media available. Report any equipment defects or other potential hazards to your supervisor. Remove any defective equipment from service immediately and either replace it or have it repaired by a qualified person.

Use a hot work permit when appropriate to ensure the area is safe for hot work. If all of the potential fire hazards cannot be removed, then use barriers, covers, or other guards to control the heat, sparks and slag in order to protect the fire hazards that cannot be removed. Refer to Cianbro's Watch for Fire, Smoke, and Sparks Safety Policy and Procedure for additional information and for a Hot Work Permit form.

Never carry a butane lighter when doing hot work; sparks or slag may cause it to explode.

- 7.8.4 Heat stress must be considered due to the protective clothing worn and the heat generated from the welding process especially when there are high ambient temperatures (indoors or out doors), work in confined spaces, or spaces with inadequate ventilation. Follow Cianbro's Exposure to Heat and Cold Safety Policy and Procedure.
- 7.8.5 Noise is a hazard in the welding environment because of the process (air arc and plasma arc cutting are very noisy for example), the power source, other equipment in the area, and other operations going on like grinding. If engineering or administrative controls like shielding the noise source or separating operations by distance or time don't reduce the hazard to an acceptable level, then appropriate hearing protection must be used. Refer to Cianbro's Hearing Conservation Program Safety Policy and Procedure.

7.9 Safety At Home

Welding and other hot work provides the same hazards whether you are at home or at work other than possibly length of exposure. Please follow the guidelines contained in this policy to help recognize and control hazards associated with welding and other hot work performed outside of work.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

- 9.1 See attachments.

Minimum Respiratory Protection for Cutting and Welding Processes

Welding Process and Base Metal		Adequate Ventilation: Local exhaust ventilation is used to capture fumes or in open area with adequate air movement or adequate dilution ventilation with directional air flow away from team member. The fume cannot be drawn through the team member's breathing zone.	Inadequate Ventilation: Local exhaust ventilation not used or inside enclosed spaces with inadequate air movement or air movement draws contaminant through breathing zone of team member.	Comments
Shielded Metal Arc Welding (stick)	Carbon Steel	Not required	1/2 face respirator with 100 efficiency cartridges	Manganese
	Other alloys and galvanized	Not required. Air sampling required to verify	1/2 face respirator with 100 efficiency cartridges	Manganese
Gas Tungsten Arc Welding (TIG)	Carbon Steel	Not required	Air supplied respirator required	Ozone
	Other alloys and galvanized	Not required. Air sampling required to verify	Air supplied respirator required	Ozone especially with aluminum
Flux Core Arc Welding	Carbon Steel	Not required	1/2 face respirator with 100 efficiency cartridges	Fume capture guns considered adequate ventilation, Manganese
	Other alloys and galvanized	Not required. Air sampling required to verify	1/2 face respirator with 100 efficiency cartridges	Manganese
Gas Metal Arc Welding (MIG)	Carbon Steel	Not required	Air supplied respirator required	Ozone, Manganese
	Other alloys and galvanized	Not required. Air sampling required to verify	Air supplied respirator required	Ozone especially with aluminum, Manganese
Sub- Arc Welding		Not required	1/2 face respirator with 100 efficiency cartridges	Creates minimal fume
Plasma Cutting		Air Supplied Respirator Required (unless using local exhaust ventilation and sampling is being done for ozone – can use 1/2 face respirator with 100 efficiency cartridges with ozone protection)	Air supplied respirator required	Ozone may be able to control exposure with directed ventilation (fan) for 100% water immersion table. Sampling required.
Oxy- Fuel Cutting	Carbon Steel	Not required	1/2 face respirator with 100 efficiency cartridges	
	Other alloys and galvanized	Not required. Air sampling required to verify	1/2 face respirator with 100 efficiency cartridges	
Air Arc/ Carbon Arc		1/2 face respirator with 100 efficiency cartridges	PAPR or full face respirator quantitatively fit, both with 100 efficiency cartridges	Large amounts of fume generated
Lance Rod Cutting		1/2 face respirator with 100 efficiency cartridges	Air supplied respirator required	Typically used on demo jobs with coated steel present. See #3 below
Cad Welding		Not required	1/2 face respirator with 100 efficiency cartridges	Should be able to provide adequate ventilation in most cases

Exposure Guidelines for Welding Fumes and Gases

Material (Fumes)	8-Hour Time-Weighted Average (TWA) Exposure Limit		Potential Effects and Symptoms From Overexposure ³
	OSHA PEL ¹ (mg/m ³)	TLV ² (mg/m ³)	
Aluminum	5 (respirable)	5	Skin irritation, respiratory system irritation, pulmonary fibrosis
Arsenic	0.01	0.01	Respiratory irritation, lung cancer, dermatitis
Beryllium	0.002 0.005 (C) ⁴	0.002	Lung disease (berylliosis), lung cancer, eye irritation
Cadmium	0.005	0.002 0.01 STEL ⁵	Respiratory irritation, lung congestion, abdominal pain, kidney damage, yellow ring on teeth
Chromium II & III Compounds and metal	0.5	0.5	Lung disease, nasal irritation, sensitization, eye irritation
Chromium VI compounds (insoluble)	0.005	0.01	Lung cancer, nasal irritation and perforation, liver and kidney effects
Cobalt	0.1	0.02	Lung disease, wheezing, hypersensitivity, asthma, cardiovascular system effects, eye irritation
Copper	0.1	0.2	Metal fume fever, respiratory irritation, skin and hair discoloration
Fluorides	2.5	2.5	Respiratory irritation, mottling tooth enamel, bone changes, kidney effects
Iron oxide	10	5	Siderosis (pigmentation of the lung)
Lead	0.05	0.05	Central nervous system effects, lead poisoning, reproductive system effects
Magnesium oxide fume	15	10	Metal fume fever, eye and nose irritation
Manganese fume	5(C) ⁴	0.2	Nervous system effects(Parkinson's), pneumonia, reproductive system effects, metal fume fever
Mercury	0.1(C) ⁴	0.025	CNS effects, kidney and reproductive effects, eye irritant, cough, chest pain
Molybdenum	5	5	Respiratory irritation, liver and kidney effects
Nickel	1	0.2	Asthma, congestion, lung disease, carcinogen, sensitization
Tin	5 (respirable)	2	Stannosis-benign lung disease
Titanium dioxide	5 (respirable)	10	Lung fibrosis, potential carcinogen
Vanadium	0.05	0.05	Respiratory irritation, bronchitis, emphysema, pneumonia, green tongue, cough
Zinc oxide fume	5 (respirable)	5	Metal fume fever, cough, chest pain
Welding fumes – not otherwise classified	5 (respirable)	5	Depends on components of fume, metal fume fever, irritation, cough, pulmonary edema

9.3 Appendix C

Exposure Guidelines for Gases Associated with Welding and Cutting

Material (gases)	PEL (ppm)	TLV (ppm)	Potential Effects and Symptoms From Overexposure³
Argon	None	None	Simple asphyxiant
Carbon dioxide	5000	30000 STEL ⁵	Mild narcotic effects, respiratory effects, headaches
Carbon monoxide	50	25	Headaches, drowsiness, asphyxiation, anoxia
Hydrogen chloride	5(C) ⁴	5(C) ⁴	Strong irritation, dermatitis
Hydrogen fluoride	3	3(C) ⁴	Skin, eye, respiratory irritations, bone effects
Nitric oxide	25	25	Cyanotic effects, anoxia, eyes and skin irritation
Nitrogen dioxide	5(C) ⁴	3 5 STEL ⁵	Eye, nose, throat irritant, chronic bronchitis, lung congestion, chest pain, cough
Ozone	0.1	Light work 0.1 Moderate 0.08 Heavy 0.05 Any work 0.2	Respiratory irritation, lung congestion, bronchitis, headache, dry throat, premature aging
Phosgene	0.1	0.1	Lung congestion, chronic lung changes, anoxia, eye irritation

¹ OSHA Permissible Exposure Limit (PEL) as listed in 29CFR 1926.55 and accompanying standards as of 2/1/2000.

² Threshold Limit Value (TLV) as published in the 2000 TLV and BEI booklet by the American Conference of Governmental Industrial Hygienists (advisory guidelines only).

³ Primary reference sources: 1997 NIOSH Pocket Guide to Chemical Hazards and the TLV Basis-Critical Effects as published in the 2000 TLV and BEI booklet².

⁴ Ceiling Limit, not to be exceeded without respirator use.

⁵ Short Term Exposure Limit.

Policy Number: 016**Authorized By:** Michael W. Bennett**Title:** Zero Energy State (Z.E.S.) LOTO**Effective Date:** 07/01/97Page 1 of 10

1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 To establish minimum guidelines for the isolation and control of energy sources during work activities.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Affected Team Member:** Team member working near or around the area, who does not perform service, maintenance, or construction-related work. An affected team member has no responsibility for implementation of energy control procedures.
- 4.2 **Authorized Supervisor:** Authorized team member responsible for coordinating a satellite box lock-out.
- 4.3 **Authorized Team Member:** Team member responsible for performing the service or maintenance and implementation of the energy control procedures.
- 4.4 **Energy Isolation:** Physical barriers used to prevent energy release: valves, electrical breakers, gates, doors, etc.
- 4.5 **Lock-out:** To maintain energy isolation and to prevent any release of energy.
- 4.6 **Lock-out Devices:** Hardware used to facilitate lock-out of energy isolation such as padlocks, chains, gang lock hasps, "multi-lock-out tree," or dead-bolt pins.
- 4.7 **Lock-out List:** A living document that records equipment description, equipment number, isolation location, verification, lock number, date(s), and authorized team members.
- 4.8 **Lock-out Method:** Procedures to implement and document lock-outs.
- 4.9 **LOTOC: Lockout Tag Out Coordinator:** The team member(s) assigned to work with the client's representative and the Cianbro Companies' supervision to coordinate and verify the lock and tag process. See Appendix B
- 4.10 **Satellite Box:** A secure container with a lockable cover and hasp. Example: small tool box, a sawzall box, etc.
- 4.11 **Tag:** A sturdy plastic attachment to every lock that records name, date, and company name.
- 4.12 **Verification:** Documented action taken to verify energy isolation, such as a qualified operator engaging a start button.

5 Policy

- 5.1 To require that Lock-out procedures be utilized when there is a potential for an unexpected release of hazardous energy during the construction and/or maintenance of any system.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of Lockout /Tagout (LOTO) procedures under this policy.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.3 Corporate Safety is responsible for maintaining this document.

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7.1 Required by OSHA

The OSHA general industry standards mandate that lock-out procedures provide a level of protection equal to that of an individual lock-out when performing maintenance work. The group leader-type lock-out procedure, however, is permissible on new construction work only. OSHA requirements also mandate that a lock-out program include:

- A. Written Procedures. Step by step instructions to disconnect, lock, tag, and try energy systems prior to performing work plus address the lock removal.
- B. Team member training and retraining
- C. Periodic inspection and review of lock-out procedures.
- D. Identification of energy sources that may require lock-out or ZES include:
 - Piping – process, steam, water, chemicals, etc.
 - Pneumatic – instrumentation, air tools, valves, etc.
 - Hydraulic – jacks, pumps, valves, pistons, etc.
 - Electrical – motors, switchgear, transmission lines, etc.
 - Mechanical – pumps, agitators, conveyors, etc.
 - Stored – springs, gravity, tension, etc.
 - Power Tools

Activity planning is the vehicle of communication between supervisors, craft persons, and facility managers. Successful lock-outs depend on effective communication and participation from all these parties. It is also Cianbro's responsibility to review the lock-out policies of subcontractors and ensure that they select and implement an appropriate lock-out procedure before work begins. Specific lockout information like, satellite lock box number, location of box, etc. must be included in the plans.

As you read the attached Cianbro lock-out procedure, it will be evident that there is a recognized difference between new construction work and maintenance/services work, as well as the lock-out method required for each. These lock-out procedures may be altered to meet unique conditions or host needs, provided we meet or exceed the requirements outlined within this procedure.

Specific work activities covered under the shipyard standards (1915) like, boiler piping, propulsion and anchor system controls require reviewing the 1915 standards and compliance with specific requirements listed. Documented planning will be accomplished through Cianbro's safety activity planning process following the ZES Safety Policy and Procedure.

7.2 Planning

7.2.1 Lock-out procedures to be utilized must first be identified in the initial Project Management Plan, and the lock-out procedure must be specifically incorporated into a written activity plan.

7.2.2 A Cianbro lockout/tagout coordinator will be identified to work with Cianbro and host facility competent person, for either industrial maintenance accounts or new construction start-ups. (See 9.2 Appendix B – LOTO Coordinator Job Responsibilities)

7.2.3 Inform the host facility of Cianbro's policy and procedures and obtain/review/incorporate any existing procedures that may be required by the client.

- 7.2.4 A competent person shall generate a lock-out list with client operations and/or maintenance supervisors that identifies equipment by name and, if applicable, an I.D. number. This lock-out list shall be integral to the activity plan! (Refer to SD1022 Cianbro Lockout List available on the Standard Operating Procedure - SOP or equivalent).
- 7.2.5 Identify who the authorized and affected team members are.
- 7.2.6 Notify all affected team members of lock-out method and lock-out schedule prior to implementation.
- 7.2.7 Determine what method will be used: individual lock-out, group leader lock-out, or satellite box lock-out and implement method selected. Before starting work always lock, tag and try/verify.
- A. Never assume that someone else has taken care of a potential hazard.
- B. Always ask the question and perform necessary checks to ensure hazard solutions have been abated.
When the host locks out equipment and/or machinery, it shall be considered to be energized equipment by all Cianbro team members, until it is verified otherwise. Remember: The LOTO process is three basic steps – Lock, Tag and Try – If it has not been verified (tried) then it is not locked out!
- C. Individual lock-out. This method may be applied when all members of a work party are deemed authorized team members and each team member places a lock and tag on every item on the lock-out list. This application is most effective with a limited number of team members and energy sources to be locked out.
- D. Group leader lock-out (new construction only).
- Single crew work activity: The supervisor or foreman may represent a crew or specific activity as the authorized team member during lock-out. This method is well suited to a relatively small crew size where the supervisor/foreman has tight control over work activities. His/her lock and tag is the only one required to lock an energy source out. Lock, Tag, and Try (LTT) must be accomplished before working to ensure that zero energy exists.
 - Multiple crew work activity: At a time before new systems, equipment, or circuits become subject to sources of energy, they will be locked and tagged at the energy source by the designated lockout/tagout coordinator (LOTOC) with assistance from the respective discipline supervisor or foreman. The lock used shall be under the control of the Cianbro safety department. A white tag will also be used at the energy source which reads “Danger . . . Do Not Operate Without Contacting Cianbro.”
 - Other contractors or vendors required to perform work on process systems/equipment, covered under new construction LOTO procedure, shall designate an authorized person responsible to conduct group LOTO for their worker(s) locking/tagging a single lock/tag at the energy source.
 - When the new system, equipment, or circuit(s) requires energizing for check out/motor bumping, the respective Cianbro supervisor or foreman shall request the Cianbro LOTO to have locks and tags removed for a specified period of time necessary to conduct checkout.
 - The LOTO, in coordination with responsible parties conducting the test, will ensure that people are clear from the new equipment, systems, or circuits to be checked out.
 - Either informational white tag(s) should be placed on all potential energy sources, stating: “Danger . . . System can be energized! Construction Lock-out required”; or the hazard area should be barricaded.
 - The LOTO will follow up with the responsible party conducting the checkout of the new system, equipment or circuits, to confirm checkout testing is complete, and place lock and tag back onto the energy source.
 - New systems, equipment, or circuit(s) requested by the host (owner) to be released to them must be coordinated throughout the respective Cianbro supervisor or foreman.
 - With approval from the respective Cianbro supervisor or foreman, the Cianbro LOTO removes lock and tag from the new system, equipment, or circuit(s) energy source.

- The responsible Cianbro supervisor ensures that either the hazard area is barricaded or a green tag is posted at all potential energy sources turned over to the host owner which states: "System can be energized. This system has been turned over to the host (owner) operations and Cianbro's individual lock-out or satellite box lock-out applies."
 - All systems turned over to the host (owner) will fall under the host (owner) facility's LOTO program.
- E. Satellite lock-out. This method is used by the authorized supervisor when performing multi-crew maintenance type work, large crew numbers (>10), or multiple energy sources and is implemented as follows:
- The authorized supervisor places all locks and tags at the energy isolations on the lock-out list.
 - The authorized supervisor then places all keys to locks in the satellite box and secures the hasp with his/her own lock.
 - Place the satellite box at a central location such as the tool crib, and post lock-out list at red box.
 - The authorized team members can now place their individual lock on the satellite box.
 - The authorized supervisor shall be the first to lock the satellite box but the last team member to remove their lock off the red box.
 - Satellite lockboxes are to be taken down at the end of each shift, and all locks removed from the client's lockboxes. The incoming crew front line supervisor will re-establish both the locks on the client's lockbox/s as well as the satellite lockbox accompanied by the rewritten Cianbro lockout cover sheet.
 - Satellite lockboxes are to be used for Cianbro authorized team members, and subcontractors working for Cianbro. Other contractors working for the client will not be allowed to lock on Cianbro satellite lockboxes without prior approval.
 - Under no circumstances should the satellite lockbox contain anything but the lockout keys for Cianbro locks on client lockbox/s out in the field. (do not store excess lockout energy isolating devices inside the lockboxes being utilized)
 - Anytime a client's lockbox has to be opened for equipment repositioning, or bumping, the crew front line supervisor shall request the LOTO to remove the safety lock, tags, and safety seal for a specified period of time necessary to conduct the checkout.
 - All satellite lockboxes should be numbered, and have an attached Cianbro lockout cover sheet with the required information (client lockbox information), written on the document. If at all possible, stamped or otherwise identifiable photocopies of the initialed lockout procedures pertinent to the work to be performed should be included with the Cianbro cover sheet.
 - All written Daily Activity Plans involving lockout will have specific lockout information incorporated in the plans, (satellite lockbox number, location, and reference to the Cianbro cover sheet for more detailed lockout information).
 - A plastic safety seal system, fixed-loop plastic tamper resistant seal, 10 inches, should be used, (seal affixed to the client's lockbox to ensure the lockout has not been compromised when all locks are off the client's lockbox). The Cianbro safety seal will be installed by the designated LOTO, or their designees at the same time Cianbro's safety lock is locked onto the client's lockbox.

7.2.8 Always remove personal padlocks and tags from any completed previous work assignments before starting a new activity requiring lockout/tagout to another system.

7.2.9 Performing work in MCC electrical rooms.

- There must be a minimum of two Cianbro people (one being a competent electrician) working at all times in a MCC room when panels are open. No team member will ever be left alone.
- All other work in an MCC room will be evaluated for electrical hazards by a competent electrician. If electrical hazards are not found to exist, work can proceed until the hazards change.

7.3 De-Energization

- 7.3.1 Only qualified operators who have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the methods or means to control the energy may shut down equipment and/or machinery. (Note: A qualified operator is a supervisor of the host facility.)
- 7.3.2 Only qualified operators may perform the applicable energy isolation and install host facility lock and tag.
- 7.3.3 Any stored or residual energy must be dissipated or restrained under the supervision of a qualified operator.
- 7.3.4 The LOTOC must witness that zero energy checks have been performed by the qualified operator verifying the energy isolation by pushing the start button or other appropriate means.
- 7.3.5 Any team member locking out equipment must use the following guidelines:
- Authorized team members must read and understand the lock-out list (refer to SD1022 Cianbro Lockout List available in the Standard Operating Procedures - SOP).
 - Install lock and a tag, displaying the date, company name "Cianbro," and authorized team member name. Use sturdy tags that are standard within the host facility—avoid paper cardboard tags. It is strongly recommended that laminated photo I.D. lock-out tags be used.
 - If the satellite box method is used, the authorized supervisor(s) will place all lock-out keys in the red box. They will be the first person to lock the satellite box.
 - Document all lock and tag placements on the lock-out list and post near the work area.
- 7.3.6 All power tools (electric, pneumatic, powder-actuated, battery-operated, hydraulic, etc.) shall have the power source disconnected or disabled prior to maintenance on the tool. This includes replacement of bits, blades, discs or anything that could be a hazard if the tool should start, as well as any repairs or adjustments being made to the tool. Note: If the disconnecting of the power source creates a serious hazard (i.e. a magnetic drill that is on a vertical surface that could drop when the power is disconnected, etc.) then the power can remain connected. The specific Activity Plan must identify the alternate safe procedures to be followed in this case.

7.4 Energization

- 7.4.1 The authorized team member must inspect the equipment/machinery for loose parts, tools, rigging, safety devices such as guards, barricades, and warning signs.
- 7.4.2 The authorized team member must notify the host facility and all affected team members prior to the removal of lockouts. Clear all personnel away from machinery.
- 7.4.3 Authorized team member(s) remove the lock and tags provided the tag has that team member's name on it. Unauthorized removal of another team member's lock or tag is cause for immediate disciplinary action, up to and including discharge.
- 7.4.4 Exception to the above paragraph (7.4.3). The project manager with the senior safety specialist may remove another team member's lock or tag when the following conditions are satisfied:
- Verification that the authorized team member who applied the lock and tag is not at the facility, such as a signed out or brassed out record at security.
 - All practical attempts have been made (telephone call) to contact the authorized team member to return to the facility and remove his/her lock or the team member consents to the removal of his/her lock.

- The authorized team member must be informed that their lock was removed before he/she is allowed to return to work and disciplined in their failure to follow procedure.
- The system must be walked down by the project manager with the senior safety specialist before activating.

7.4.5 When equipment and/or machinery are locked out by the host, it should be considered to be energized equipment by all Cianbro team members, until it is verified otherwise.

7.5 Team Member Training

7.5.1 All involved team members must be trained on energy control procedures. Training should be structured to address two groups of team members: authorized team members and affected team members.

7.5.2 Authorized team members. Training must include:

- A. Details on the type and magnitude of the hazardous energy sources present in the workplace.
- B. The methods and means necessary to isolate and control those energy sources (i.e. the elements of the energy control procedures).
- C. Additional training must be provided for the following circumstances:
 - A change in job assignments.
 - A change in machine(s), equipment, or processes that present new hazards.
 - A change in the Energy Control Procedures.
 - When inspections reveal that an employer has reason to believe that there are deviations from or inadequacies in the team member's knowledge or use of the Energy Control Procedure.

7.5.3 Affected team members. Training must include:

- How to recognize when lockout/tagout procedures are being implemented.
- A discussion on the purpose of the procedure and the importance of not attempting to start up or use the equipment that has been locked or tagged out.
- Infractions of lockout/tagout procedures and resulting actions.

7.5.4 All training must be documented, including:

- Team member's name and social security number.
- Dates and type of training.
- Name of competent person performing the training.

7.5.5 The following points are required for a successful and incident-free lock-out:

- Plan the activity.
- Communicate the plan.
- Individual satellite box lock-out will be the norm, not the exception.
- Document all steps.
- Team members will be held accountable for their actions.

7.5.6 This Lock-out Procedure will be reviewed periodically; inspections of the procedure will be conducted and documented at least annually, and updated as necessary. Please refer to SD1022 Cianbro Lockout List available in the Standard Operating Procedures – (SOP) for additional information regarding lock-out lists.

7.6 Safety At Home

Hazards around stored energy at home can be as dangerous or deadly as those at work. Use the information in this ZES Policy to keep your family safe.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

- 9.1 See attachments.
- 9.2 Documents available on Cianbro.net >Standard Operating Procedures - on the SOP.

Cianbro Lockout List	SD1022
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EXAMPLE

Informational Lockout/Tagout Package

C – Recovery Lockboxes for Cianbro’s Scope of Work

Lockbox – 66R66 (Boiler Fireside) Tentative Lockout Time (Tues. 9/16 – 7:00 am)
(C – Recovery Control Room.)

- Remove hand hole caps.
- Replace primary air ports.
- Downwind differential sample from secondary air wind box.
- Generating hopper and mud drum drain.
- Replace super heater tubes as required.
- Move vibration bars, hot & cold sides.
- Remove steam drum internals.
- Plug generating bank tubes.
- Replace steam drum Internals.

Lockbox – 21R68 (Boiler Waterside) (Mon. 9/15 – 11:00 am)
(C – Recovery Control Room.)

- Remove hand hole caps.
- Generating hopper and mud drum drain.
- Replace super heater tubes as required.
- Move vibration bars, hot/cold sides.
- Remove steam drum internals.
- Plug generating bank tubes.
- Replace steam drum internals.
- C-Recovery phosphate chemical line needs to be repiped.

Lockbox - 46R07 (Smelt Spout Cooling Water System.) (Mon. 15th 12:00 Noon)
(C – Recovery Control Room.)

- Change 4 Smelt Spouts

Lockbox – 11R01 (Smelt Dissolving Tank) (Tues. 16th 7:00 am)
(C – Recovery Control Room.)

- Change 4 Smelt Spouts

Cianbro LOTO (Lockout/Tagout Coordinator)

Job Responsibilities

- A Cianbro lockout/tagout coordinator will be identified to work with Cianbro and host facility competent person(s) for industrial accounts and new construction start-ups, at a minimum.
- Establish good working and communication relationships with the client's key contact personnel in reference to lockout / tagout on industrial maintenance accounts, or new construction start-ups.
- Attend informational lockout/tagout meetings scheduled by the client.
- Select, and develop a lockout support group on site to assist in the lockout processes for scheduled shutdowns.
- It will be the responsibility of the LOTO, and support staff (to include the crew front line supervisors) to receive for review from the client, all lockout procedures to be used by Cianbro personnel for lockout.
- Organize, and coordinate with client contacts, lockbox walk throughs prior to the scheduled shutdowns. Coordinate with the client to make the necessary modifications, if any, to the procedures reviewed.
- Develop informational lockbox/lockout packages to be distributed to Cianbro shutdown supervisors prior to the outage for reference purposed. (Reference Attachment A)
- Establish key lines of communication with the client to keep Cianbro LOTO / Safety Team continuously involved in the lockout process before and during shutdowns, walking the lockboxes (looking at all the things to be locked out) (walk down systems to be locked out) witnessing that zero energy checks have been performed, applying the Cianbro safety lock, tag, and Cianbro safety seal (fixed – loop plastic tamper seals 3/8 x 10”) to the client's lockbox) that affect Cianbro team members.
- Assist the crew front line supervisor in completing the Cianbro cover sheet (SD1022 available on Cianbro.net) on satellite lockboxes being established.
- Keep a chronological log of the client's lockboxes established, and locked onto, to cover Cianbro's scope of work. This log will also serve as a road map as to where the locks are out in the field once the work is completed.
- Continuously monitor the use of satellite lockboxes, and communicate to the crew front line supervisor any changes to the client lockout that may impact the use of their satellite boxes.
- Do the lockout leg work for the crew front line supervisor when the client asks to have additional work done, or makes modifications to the existing scope of work.
- Be directly involved with the client's equipment repositioning, bumping processes affecting Cianbro personnel. The LOTO in coordination with the responsible party conducting the test will ensure that the people are clear from the equipment, systems, or circuits to be checked out. The LOTO will remain with the responsible party conducting the checkout, or witness that the lockbox has been re-secured while testing is going on. Once the testing is complete, and the energy source has been re-instituted into the lockout, and tested for zero energy, the client lockbox will be re-established, and the Cianbro safety lock, tag, and new seal applied by the LOTO.
- Coordinate with the crew front line supervisor the lock removal process once the work has been completed.

Policy Number: 017**Authorized By:** Michael W. Bennett**Title:** Hand and Finger Protection**Effective Date:** 12/01/96Page 1 of 5

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To eliminate hand and finger injuries by a thorough identification of the hazards and providing an adequate level of protection.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 None

5 Policy

- 5.1 Appropriate gloves are required to be worn whenever hard hat, hard toed boots and safety glasses are required and in addition we will use effective engineering and administrative controls to prevent injury.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviations from the requirements contained in this policy.
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 The Corporate Safety Department is responsible for maintaining this document.

7 Hand and Finger Protection Index

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7.1 Your hands are one of the most complex parts of your body. These valuable servants are extremely vulnerable to injuries and account for 35% of our total injuries. Simply by using appropriate work gloves, hand and finger cuts and punctures can be reduced dramatically. Ironically, gloves are the easiest, most effective means of protection. However, the most effective prevention of hand and finger injury is awareness and planning.

7.2 Protective Hand Wear

7.2.1 Standard work gloves do not always provide adequate or appropriate protection for all jobs. A variety of special purpose gloves are made to provide protection from specific hazards such as intense heat, electrical shock, chemicals, tying rebar, steel rework, etc.

7.2.2 When planning work, each **Activity Plan** should address the need for hand protection. Cianbro has evaluated our recommended leather gloves, which have proven to be versatile even in some of the most demanding and sensitive functions from tying rebar to using small hand tools. However, hand protection must be selected appropriate for the hazards of the specific activity.

7.2.3 Exceptions to the use of gloves

- When a hazard analysis identifies that the use of gloves creates a greater hazard, it shall be identified in the activity plan and include what we are going to do in order to protect team members' hands.
- If the work cannot be physically done with gloves on, identify which specific tasks will be done without gloves. If a different type of glove will work, then that glove must be used.

7.3 Hand and Finger Hazards

The following are common hand and finger hazards that contribute to injuries on Cianbro projects:

7.3.1 Mechanical hazards are equipment that shear, spin, pound, crush, pinch, puncture and cut.

- Pinch Points - avoid placing your hand between moving objects.
- Automated Machine - relays, remote controllers, delay timers and robotics can cause machinery to start up suddenly.
- Rotating Machine - rotating devices such as drill bits, saw blades and milling cutters can be very hazardous.
- Machine Guards - use, **do not** remove machine guards or shields.

7.3.2 Contact hazards like chemicals, cleaners, poisonous plants and bacteria may damage the skin. Also, many chemicals can be absorbed through the skin. Rubber or impermeable gloves should always be used when handling chemicals. "Rubber" gloves can be made of natural rubber, butyl rubber, neoprene or other materials like nitrile, poly-vinyl alcohol (PVA), poly-vinyl chloride (PVC), or viton and the right glove material needs to be used for each chemical. Refer to the chemical MSDS or contact the glove manufacturer to determine the proper glove material for the hazard.

- 7.3.3 Environmental hazards like heat, vibration, sparks, cold, rough materials, electricity and heavy or sharp objects may present a problem in any work activity. Appropriate hand protection must always be identified prior to starting any activity.
 - Cut resistant gloves and sleeves are available and should be used for tasks requiring hand cutting or trimming with sharp blades. They should also be used when working around sharp-edged steel pieces, etc. Anti-vibration gloves offer the best protection when using vibrating tools like the 9000 chipping hammer. If there is 30 minutes of vibration exposure in an hours' time, team members are required to wear anti-vibratory gloves from the onset of activity.
- 7.3.4 Housekeeping hazards contribute to falls, and hand injuries usually result from using your hands to break a fall.
- 7.3.5 Loose clothing and jewelry can easily get caught in moving machinery. Always remove all jewelry and roll up shirtsleeves before beginning work around moving machinery.

7.4 Hand Tools

- 7.4.1 Inspect all hand tools before using and remove from service any damaged or defective tool. Select the right tools for the right job and never apply unnecessary pressure.

Inspect your hand tool power cord - is it damaged? Does it have the right color tape?

- When possible, use a box end wrench and pull against it. Never push against the wrench.
- When using a screwdriver, place object in solid position. **Never** hold object in your hand and screw. Be aware of the stabbing potential.
- In most operations, the blades of knives should be kept sharp and always cut away from your body. Store knives separately from other tools. Do not use a knife as a screwdriver and if possible use retractable blades.

- 7.4.2 The use of a razor knife or other knives is the last resort. Always find a different tool if possible.

- Folding knives, if used, must be of the locking variety.
- Team members shall always cut away from any part of their bodies or any TM in proximity regardless of the type of blade being used
- The standard utility knife on a Cianbro project shall have a self-retracting blade. If a utility knife without a self-retracting blade needs to be used, it must be approved by the supervisor. If approved, then the use shall be identified in the activity plan along with specific methods to use the blade safely. This shall include at a minimum cut resistant gloves and cut resistant sleeves.
- Stripping cable with a blade is the last resort and always requires cut resistant gloves and a cut resistant sleeve on the arm not holding the knife.
- PPE Requirements: When using a knife the user must wear cut resistant gloves. Sleeves are required for any repetitive use of knives and for incidental use of knives if the risk cannot be controlled by cutting away from all parts of your body. When the activity requires the knife to be used in close proximity to other parts of the body (such as the legs or chest) then a protective covering will be worn to protect those areas as well (bibs, aprons, jackets, etc.).
- Knives not allowed: Non-Locking folding knives, switchblades, throwing knives, double-edged blades, folding utility knives
- Fixed knives shall be kept sheathed and folding knives shall be kept in the closed position when not in use. Do not lay down knives with unprotected blades.
- Tasks for which an appropriate knife may be the right tool:

Cutting rope, string, twine	Cutting cardboard, light burlap
Scoring sheetrock	Cutting light plastic materials, light rubber
Stripping certain types of wire	Cutting flashing and backing rod
Emergency use over water in an aerial lift (cut lanyard if in the water)	

NOTE: A small cut can have serious consequences. Please clean wounds and protect from infection regardless how small it may be.

7.5 Machine Safeguards

- 7.5.1 Most machines have built-in safeguards in order to protect your hands and other parts of your body from hazards.
- Never operate a machine or power tool that has had its guards or safety features removed.
 - Never remove a safeguard.
 - Install guards or other safety devices to equipment, where practical for safety protection.

7.6 Hidden Hazards and Disorders

7.6.1 Repetition - some activities like painting, key punching and hammering require wrists, hands and fingers to repeat rapid, twisting motions many times per day.

7.6.2 Strain - awkward postures and bent wrists are often maintained for long periods in activities like hammering, typing, driving and scrubbing.

7.6.3 Pressure - when using hand tools like pliers, screwdrivers, scrapers and scissors, tendons and blood vessels can be pinched if tool handles have sharp edges, grooves for fingers, or are the wrong size.

7.6.4 Vibration - injury can occur from improper use of tools such as sanders, grinders, pavement breakers, drills and chain saws.

7.6.5 Some examples of Cumulative Trauma Disorders

- Tendonitis - tendons can be inflamed from repetitive motion and bent wrists causing friction of tendons against carpal bones and ligaments.
- Tenosynovitis - a tendon and its protective sheath can swell from repetitive motion, pinching, pressure of tool handle and bent wrists.
- White Finger - circulation in fingers or hands can be damaged after using vibrating tools especially in cold environments.
- Carpal Tunnel Syndrome (CTS) - major nerves inside ligaments and carpal bones of the wrist are subject to damage when forceful, repetitive motion occurs during bending and twisting the wrist.

7.7 What Do We Do To Minimize Hidden Hazards and Disorders?

7.7.1 The facts are clear. If we would just identify the right glove for the hazard and wear them 100% of the time, our number of hand and finger injuries would reduce dramatically.

- Work with your wrists in a neutral or nearly straight position as much as possible.
- Whenever possible, alternate forceful or repetitive hand tasks from hand to hand.
- Avoid prolonged or unprotected vibration exposure to your hands from tools or other sources.
- Break hourly for brief hand stretches and to “shake out” your hands when doing work requiring forceful grasp.
- Do your regular stretches and do them correctly - before, during and after work.

7.8 Safety At Home

Make sure you are using the proper PPE for at home use. Hands are your most critical tool. Make sure you are protecting them at home as much as you are at work. Don't put your hands where they could get injured.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 Not applicable.

Policy Number: 018

Authorized By: Michael W. Bennett

Title: OSHA Recordable Cases

Effective Date: 03/01/87

Page 1 of 9

1 Status

1.1 Update of existing policy, effective 03/05/15.

2 Purpose

2.1 To accurately report OSHA recordability cases.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 MSD: Musculoskeletal Disorders.

4.2 OSHA recordable, lost time: Days away from work.

4.3 OSHA recordable, non-lost time: Medical treatment beyond first aid.

4.4 OSHA recordable, restricted time: Restricted Work Activity (RWA).

4.5 PLHCP: A **P**hysician or other **L**icensed **H**ealth **C**are **P**rofessional is an individual whose legally permitted scope of practice allows him or her to independently perform, or to be delegated the responsibility to perform, the activities described by this regulation. (In most states, from a practical standpoint that is a registered nurse, physician's assistant, nurse practitioner or physician (DO or MD).

4.6 Work Environment: The establishment and other locations where one or more team members are working or present as a condition of employment. It includes not only physical locations, but also the equipment or materials used by team members during the course of their work.

5 Policy

5.1 Cianbro will maintain and retain accurate records as set forth by the Occupational Safety and Health Act of 1970 and Part 1904.

6 Responsibilities

6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for final decision on how to report on the OSHA 300 log.

6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.3 The corporate safety department is responsible for maintaining this document.

7 OSHA Recordable Cases Index

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7.1 OSHA

- 7.1.1 The Occupational Safety and Health Act of 1970 require Cianbro to record and report work related fatalities, injuries and illnesses. These records determine Cianbro's recordable incident rate (RIR) and when compared to other contractors across the country are an indication of Cianbro's "safety record".
- 7.1.2 OSHA reporting requirements determine frequency and severity to allow individual team members to focus their efforts on improvement. It is important that we present an accurate picture of our ability to work safely.
- 7.1.3 The recordable incident rate is determined by multiplying the number of recordable injuries by 200,000 (one hundred workers for one year) then dividing by the actual number of work hours. The calculation emphasizes both large and small numbers of team members. Cianbro's incident rates are based on the record of Cianbro team members and others under direct Cianbro supervision such as temps. Do not include injuries or work hours of subcontractor team members that are under their own supervision in these records or calculations.

$$\frac{N \text{ (recordable cases)} \times 200,000}{\text{YTD work hours}}$$

7.2 Recordability and Recordkeeping and Posting

- 7.2.1 Generally, work-related injuries and illness that require treatment beyond first aid are considered recordable.
- 7.2.2 New recordable injuries must be entered on OSHA Form 300-Log of Work-Related Injuries and Illnesses. Safety Administration in the corporate office in Pittsfield, Maine will do a bi-annual review with each project to keep the corporate log updated. The official OSHA 300 for all projects is the corporate log; because most of our project sites are over within a 12 to 36 months period. This log must be updated and maintained for five years following the year that it covers.
- 7.2.3 OSHA Form 300A- Summary of Work-Related Injuries and Illnesses must be posted from February 1 to April 30 for the year preceding the posting period.

Note: For a copy of a jobsite OSHA 300A form, contact the Corporate Safety Department.
- 7.2.4 Recordability may depend on many factors including the severity of the event or exposure, treatment required, medications administered, return-to-work/injury management plan, and Cianbro's relationship with the injured team member and treatment provider. Pre-planning and relationship building are critical components of injury management and can substantially impact our incident rates.

7.3 Investigations

- 7.3.1 The Cianbro First Report of Incident (form DM001) is to be used for initial investigation and reporting of all injuries and near misses. This form and any supporting materials must be completed and forwarded to disabilitymanagement@cianbro.com.
- 7.3.2 It may be difficult to determine whether an injury or illness is work-related. It is extremely important that all injuries and near misses, regardless of the apparent severity, be thoroughly investigated to discover and explore all of the facts surrounding the incident. Investigations should include identifying the mechanism of injury, the duration and type of activity being performed by the injured team member, taking any witness statements, and any other relevant details. All incidents or injuries must be taken seriously. Incidents or injuries that appear to be minor at the start sometimes end up becoming an OSHA recordable. We can minimize the number of recordable injuries with proper planning, and ensuring that all incidents are investigated for root cause and that appropriate treatment is provided promptly. See Safety Policy and Procedures: #023 Incident Investigation and #038 Injury Management and First Report of Incident (form DM001).
- 7.3.3 First reports of injury and any accompanying investigation will be reviewed pursuant to Cianbro protocol for recordability and work-relatedness using causation factors based on ACOEM standards.

7.4 Injury Management

- 7.4.1 The project safety specialist or designee must accompany the injured team member to the designated clinic or doctor's office. At the visit the safety specialist should discuss with the provider the nature and severity of the injury, recommended treatment, work modifications (if any) and follow-up care. The safety specialist will explain Cianbro's modified work program to assure the provider that we will accommodate any work modifications given to the team member. This is an effective tool for the prevention of recordable and lost time incidents. It is important that we demonstrate to the injured team member and the doctor how important that team member is to us. The extra time spent with our people and medical providers will demonstrate our concern and care; develop trust and create a spirit of cooperation that will benefit the entire Cianbro team.
- 7.4.2 Upon return to the jobsite, the work modifications agreement form must be reviewed and signed by the team member, safety specialist and supervisor to ensure that the work modifications are understood and will not be exceeded.
- 7.4.3 In an effort to provide quality medical care while also reducing recordability due to unnecessary or excessive medical intervention, treatment protocols will be presented to our network of occupational clinics. Whenever possible, the safety specialist should ask the medical provider to adhere to these protocols. The Cianbro medical director will provide support and guidance with this process.

7.5 OSHA Recordability vs. Workers Compensation

- 7.5.1 OSHA recordability and workers compensation are two independent systems. Recordable injury and illness cases do not in any way determine compensability under workers' compensation act. Each case must be investigated and evaluated on its own facts and merits. Please contact the Corporate Disability Management group to assist with appropriate reporting and processing.

7.6 Determining Work Relatedness

- 7.6.1 An injury or illness is work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or *significantly* aggravated a pre-existing injury or illness.
- 7.6.2 Cianbro requires a physician's diagnosis for work related illness. Because of the long term implications all illness cases will be reviewed by OMC.
- 7.6.3 A pre-existing injury or illness is significantly aggravated when an event or exposure in the work environment results in any of the following (which otherwise would not have occurred)
- Death
 - Loss of consciousness
 - Days away, days restricted, or job transfer
 - Medical treatment beyond first aid
 - Significant injury or illness diagnosed by a PLHCP
- 7.6.4 Work related cases involving cancer, chronic irreversible disease, a fracture or cracked bone, or a punctured eardrum must always be recorded at the time of the diagnosis by a PLHCP, even if medical treatment, days away or work restrictions are not recommended.
- 7.6.5 Work relatedness is presumed for injuries and illnesses resulting from events or exposures occurring in the work environment.
- 7.6.6 Exceptions – the following are NOT considered work-related
- At the time of the injury or illness, the team member was present in the work environment as a member of the general public rather than as a team member.
 - The injury or illness involved signs or symptoms that surface at work, but result solely from a non-work-related event or exposure that occurs outside the work environment.
 - The injury or illness results solely from voluntary participation in a wellness program or in a medical, fitness or recreational activity such as blood donation, physical examination, flu shot, exercise class, racquetball or baseball.
 - The injury or illness is solely the result of a team member eating, drinking, or preparing food or drink for personal consumption (whether purchased on the employer's premises or brought in). For example, if the team member is injured by choking on a sandwich while in the employer's establishment, the case would not be considered work-related.
 - The injury or illness is solely the result of a team member doing personal tasks (unrelated to their employment) at the establishment outside of the team member's assigned working hours.
 - The injury or illness is solely the result of personal grooming, self-medication for a non-work-related condition, or is intentionally self-inflicted.
 - The injury or illness is caused by a motor vehicle accident and occurs on a company parking lot or company access road while the team member is commuting to or from work.
 - The illness is the common cold or flu (Note: contagious diseases such as tuberculosis, brucellosis, hepatitis A, or plague are considered work-related if the team member is infected at work).
 - The illness is a mental illness. Mental illness will not be considered work-related unless the team member voluntarily provides the employer with an opinion from a physician or other licensed health care professional (PLHCP) with appropriate training and experience stating that the team member has a mental illness that is work-related. PLHCP in this case would be a psychiatrist, psychologist or psychiatric nurse practitioner.

7.6.7 Travel Status

- An injury or illness that occurs while a team member is on travel status is work-related if it occurred while the team member was engaged in the work activities in the interest of the employer.
- Hotel is considered home away from home (not recordable).
- Detour for personal reasons is not work-related (not recordable).
- Activities that are considered “in the interest of the employer” would include travel to and from customer contacts, conducting job tasks, and entertaining or being entertained to transact, discuss or promote business (with the entertainment being at the direction of the employer).

7.6.8 Work at Home

- Injuries and illnesses that occur while a team member is working at home are work-related if they occur while the team member is performing work for pay or compensation in the home and they are directly related to the performance of work rather than the general home environment.

7.7 Recordability

7.7.1 New Case

A case is new if:

- The team member has not previously experienced a recordable injury or illness of the same type that affects the same part of the body; or
- The team member previously experienced a recordable injury or illness of the same type that affects the same part of the body, but had recovered completely and an event caused the signs and symptoms to reappear.

7.7.2 Recording Fatalities

- Work-related fatalities must be recorded by checking the box for cases resulting in deaths.
- Work-related fatalities must also be reported to OSHA within 8 hours.

7.7.3 Days Away Cases

Record if the case involves one or more **calendar** days the team member was unable to work (include weekend days, holidays, vacation days, etc.)

- Do not include the day of the injury/illness.
- Cap day count at 180 days away and/or days restricted (total of both not to exceed 180).
- May stop day count if the team member leaves the company for a reason unrelated to the injury or illness.
- If a medical opinion exists, the employer must follow that opinion.

7.7.4 Restricted Work Cases

- Record if the case involves one or more days of restricted work or job transfer.
- Check the box for restricted/transfer cases and count the number of days.
- Do not include the day of the injury or illness.

Restricted work activity occurs when:

- A team member is kept from performing one or more routine functions (work activities the team member regularly performs at least once per week) of his/her job.
- A team member is kept from working a full workday.
- A PLHCP recommends either of the above.

7.7.5 Job Transfer

A job transfer occurs when:

- An injured or ill team member is assigned to a job other than his or her regular job for at least part of the day.
- A case is recordable if the injured or ill team member performs his or her routine job duties for part of a day and is assigned to another job for the rest of the day.

7.7.6 Medical Treatment

Medical treatment is the management and care of a patient to combat disease or disorder. Medical treatment **does not include:**

- Visits to a PLHCP solely for observation or counseling.
- Diagnostic procedures such as x-rays, blood tests and medications used for diagnostic purposes (such as eye drops to dilate the pupils).
- First aid.

There are 14 treatments that are considered first aid. Any treatment beyond those 14 items is considered medical treatment, regardless of who provides the care. They are:

- Using nonprescription medication at nonprescription strength (prescription medications or prescription strength of Over-the-Counter medications recommended by a PLHCP are considered medical treatment).
- Tetanus immunizations (other immunizations such as Hepatitis B vaccine or rabies vaccine are medical treatment).
- Cleaning, flushing, or soaking **surface** wounds on the surface of the skin.
- Wound coverings, butterfly bandages, Steri-strips (wound closure glue **is** considered medical treatment).
- Hot or cold therapy (any amount).
- Non-rigid means of support such as ace bandages, elbow and wrist wraps, and back belts (note that devices with rigid stays such as wrist splints would be considered medical treatment).
- Temporary immobilization device used to transport accident victims (splints, slings, neck collars, back boards, etc).
- Drilling of fingernail or toenail to relieve pressure, or draining fluid from a blister.
- Eye patches.
- Removing foreign bodies from the eye using only irrigation or a cotton swab.
- Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means.
- Finger guards.
- Massages (Note that all physical therapy or chiropractic treatments are considered medical treatment for recordkeeping purposes).
- Drinking fluids for relief of heat stress.

7.7.7 Bloodborne Pathogens

- Record all work-related needlesticks and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious material (includes human bodily fluids, tissues and organs. Record splashes or other exposures to blood or other potentially infectious material if it results in diagnosis of a bloodborne disease or meets the general recording criteria.

7.7.8 Medical Removal

If a team member is medically removed under the medical surveillance requirements of an OSHA standard, you must record the case.

- The case is recorded as either one involving days away from work or days of restricted work activity.
- If the case involves voluntary removal below the removal levels required by the standard, the case need not be recorded.

7.7.9 Hearing Loss

- A case must be recorded when a confirmed standard threshold shift meets two criteria. First, you must have a 10 db shift in one or both ears from the baseline (measured at 2000, 3000, and 4000 hz). Second, the shift must make the team members hearing greater than 25 db from audiometric zero. If both criteria are satisfied on one or both ears, then the case is recordable.

7.7.10 Musculoskeletal Disorders (MSD)

- MSD must be recorded using the same criteria as other cases.

7.8 Administration

7.8.1 Forms

OSHA Form 300 – Log of Work-Related Injuries and Illnesses OSHA Form 300A – Summary of Work-Related Injuries and Illnesses OSHA Form 301 – Injury and Illness Incident Report - Recordable cases must be entered on the OSHA 300 within 7 calendar days of receiving information that a recordable case occurred. Do not enter the name of a team member on the OSHA Form 300 for “privacy concern” cases. Enter “privacy case” in the name column. Keep a separate confidential list of the case numbers and team member names of “privacy concern” cases. Make sure to fill out the form completely and accurately including the description in column F (Include the illness or injury, parts of body affected, and object/substance that directly injured or made person ill). If you are unsure of how to fill out the log, contact the corporate office in Pittsfield, Maine and ask for the Disability Management experts.

7.8.2 Privacy Protection - Privacy concern cases are:

- An injury or illness to an intimate body part or reproductive system.
- An injury or illness resulting from sexual assault.
- Mental illness.
- HIV infection, hepatitis, tuberculosis.
- Needlestick and sharps injuries that are contaminated with another person’s blood or other potentially infectious material.
- Team member voluntarily requests to keep name off for other illness cases.
- Names must be removed when sharing information with people not authorized by the rule. Exceptions are when that information is needed to process workers compensation claims, an internal or external consultant performing an evaluation of the safety and health program and a public health authority or law enforcement agency.

7.8.3 Multiple Sites

This section requires that we keep a separate OSHA Form 300 for each job site that is expected to be in operation for more than a year. One OSHA Form 300 may be kept for all short-term jobs. Either way, each team member must be linked with one particular job.

7.8.4 Covered Team Members

The following must be included on our OSHA 300 log:

- All team members on the payroll, including part-time and seasonal.
- Employees not on our payroll, who are supervised on a day-to-day basis (Temp services’ employees working for us).
- Exclude self-employed and partners.
- Temporary help agencies should not record the cases experienced by temporary workers who are supervised by Cianbro.

7.8.5 Posting the Annual Summary

New guidelines for posting the OSHA 300A Summary: A company executive must certify the summary. That person must be:

- An owner of the company.
- An officer of the corporation.
- The highest ranking company official working at the establishment, or
- His or her supervisor.
- The summary can not be certified by the safety specialist
- Must post for 3 month period, from February 1 to April 30 each year for the year proceeding the posting period and then maintain the summary on file.
- The summary must be posted in a conspicuous location that is visible to team members.
- In addition, each column of the OSHA 300 log must be totaled at the bottom at year end.

- 7.8.6 Retention and Updating
- Retain forms for 5 years following the year that they cover (corporate log after job completion).
 - Update the OSHA form 300 during that period.
 - Do not need to update the OSHA Form 300A or OISHA Form 301.
- 7.8.7 Team member Involvement
- Cianbro must provide limited access to injury and illness records to team members, former team members and their personal and authoritative representatives.
 - Cianbro must provide one free copy of OSHA Form 300 by end of next business day.
 - Cianbro must provide one free copy of OSHA Form 301 to team member, former team member or personal representative by the end of the next business day.
 - Cianbro must provide copies of OSHA Form 301 to *authorized* representative within 7 calendar days. Provide only “information about the case” section of the form.
- 7.8.8 Prohibition Against Discrimination
- OSHA prohibits the employer from discriminating against a team member for reporting a work-related fatality, injury or illness.
 - OSHA also protects the team member who files a safety and health complaint, asks for access to the part 1904 records, or otherwise exercises any rights afforded by OSHA.
- 7.8.9 Fatality/Catastrophe Reporting
- All employers must report to OSHA:
- All work-related fatalities within 8 hours.
 - All work-related in-patient hospitalizations, all amputations and all losses of an eye within 24 hours.
 - Fatal heart attacks at work.
- Do not report:
- Highway or public street motor vehicle accidents (outside of a construction work zone).
 - Commercial airplane, train, subway, or bus accidents.
 - If event occurred more than 30 days post-incident.
- *Note: The above are still recordable on the 300 log if they meet the other criteria.
- 7.8.10 Providing Records to Government Officials
- Upon request, employers must provide copies of the records within 4 business hours.
 - Use the business hours of the establishment where the records are located.
- 7.8.11 Annual OSHA Survey
- Employer must fill out the annual OSHA random survey if requested.
 - OSHA 300 Form information does not need to be sent to any agency unless requested.
- 7.8.12 Annual BLS Survey
- Employer must fill out the annual random survey from BLS if requested.
- 7.8.13 Resources
- OSHA website – www.osha.gov
 - Forms may be downloaded from the web-site along with the standard and other recordkeeping information.
 - OSHA’s free and confidential number 1(800) 321-OSHA (6742)
 - OSHA Regional Recordkeeping Coordinator Region 1 (617)565-9856
 - Maine Safety Council (207)854-8441 www.mainesafety.org

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 References

- 023 Incident Investigation Safety Policy and Procedure
- 038 Injury Management Safety Policy and Procedure

9.2 Documents available on the SOP on Cianbro.net

First Report of Incident	DM001
Work Modification	DM002
Work Modification Agreement	DM003

Policy Number: 019**Authorized By:** Michael W. Bennett**Title:** Confined Space Entry**Effective Date:** 02/27/75Page 1 of 8

1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 To provide safe working conditions and environments so no one is exposed to injury or illness from confined or enclosed spaces.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Authorized Entrant: A person approved or assigned by Cianbro to perform a specific type of duty or duties in the confined space.
- 4.2 Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions at the confined space which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective action to eliminate them.
- 4.3 Confined Space: A space that is large enough and so configured that a person can bodily enter and perform assigned work; and:
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
 - Is not designed for continuous human occupancy.
- 4.4 Enclosed Space: Any space, other than a confined space, which is closed in on the sides and overhead.
- 4.5 Entry Supervisor: A person approved or assigned by Cianbro to assume all supervisory duties at the confined space.
- 4.6 Hole Watch Attendant: A person approved or assigned by Cianbro to monitor activities and personnel in and around the space. This person is also responsible to take emergency action should something go wrong in or around the space including ordering the entrants out of the space or to notify emergency response personnel if needed.
- 4.7 Non-permit Required: Non-permit spaces are confined spaces which do not contain nor have the potential to contain, any hazards capable of causing death or serious physical harm, with respect to atmospheric or other hazards. Examples of non-permit spaces would be new construction (excavations, new vessels/pipes, coffer cells) and existing industry spaces where the potential hazards have been eliminated as determined by Cianbro and the host.
- 4.8 Permit Required: A confined space that has the potential for one or more of the following characteristics: Contains or has a potential to contain a hazardous atmosphere; contains a material that has the potential for engulfing an entrant; has an internal configuration such that

an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or contains any other recognized potentially serious safety or health hazard. A qualified Cianbro team member must be responsible for the activity and ALL Ten Basic Rules (section 7.4 of this Safety Policy and Procedure) apply and must be included in the written activity plans. In the case of an existing industry space, a qualified host representative must also be responsible for the activity and ALL Ten Basic Rules must apply at a minimum.

5 Policy

- 5.1 Team members, subcontractors or others in our control, will follow all requirements of this policy and procedure before, during and after entry into a confined or enclosed space per this policy and the requirements of OSHA standards.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 Corporate Safety is responsible for maintaining this document and reviewing recommended changes at least annually.
- 6.3 Project teams are responsible to report any confined space issues that could warrant a change in our policy to the Corporate Safety Department immediately. Corporate Safety will make the determination as to whether the change is needed and the appropriate timeframe to make the change.

7 Confined Space Entry Index

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7.1 Identify all confined spaces in the work area.

7.1.1 If applicable, coordinate confined space entry with the host employer to ensure appropriate safety measures are taken in compliance with owner's procedures. OSHA Standards for general industry are more comprehensive and require us to follow more specific guidelines for "Permit-Required Confined Spaces". Review prior history of confined space entries and establish encountered problems.

7.2 Confined Space Entry Considerations:

Once the work location is identified as a confined space, then distinction must be made whether it is a permit-required or non-permit required space.

7.2.1 Non-Permit Required

Non-permit spaces are confined spaces which do not contain nor have the potential to contain, any hazards capable of causing death or serious physical harm, with respect to atmospheric or other hazards. Examples of non-permit spaces would be new construction (excavations, new vessels/pipes, coffer cells) and existing industry spaces where the potential hazards have been eliminated as determined by Cianbro and the host.

A qualified Cianbro team member responsible for the activity must determine which of the ten basic rules (section 7.4 of this Safety Policy and Procedure) apply and need to be specifically included in written activity plans. A qualified host representative must concur with the non-permit space determination, if an existing industry space.

7.2.2 Permit Required

A permit required confined space has potential for one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- Contains any other recognized potentially serious safety or health hazard.

A qualified Cianbro team member must be responsible for the activity and ALL Ten Basic Rules (section 7.4 of this Safety Policy and Procedure) apply and must be included in the written activity plans. In the case of an existing industry space, a qualified host representative must also be responsible for the activity and ALL Ten Basic Rules must apply at a minimum.

7.3 Hazard Identification and Assessment:

7.3.1 Determine if work can be done from outside the confined space. Do not enter unless absolutely necessary.

7.3.2 A detailed written activity plan must be generated for all confined space activities.

- 7.3.3 Activity plans must be developed based on the applicable minimum requirements listed in Section 7.4 of this Safety Policy and Procedure. Additionally, if the work falls under the marine standards, then the requirements of Subpart B of 29 CFR 1915 must be met.
- 7.3.4 Each item listed in Section 7.4 of this Safety Policy and Procedure must also be evaluated and considered in activity plans if applicable to the type of confined space activity.
- 7.3.5 Hazard solutions must be clearly stated in the activity plan and reviewed with each team member in the work party before starting work.
- 7.3.6 Include plans for the protection of team members from all external hazards including, but not limited to other work going on, pedestrians, vehicles, and overhead work.
- 7.3.7 Additional planning and coordination must be done in cases where we are required to work with other contractors or client personnel inside the same confined space. We need to ensure that their activities do not have the potential to endanger our team members.
- 7.3.8 Entry permits must be voided once entry operations are completed or when a review of the permit is required due to the detection of a hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, or a team member complaint about the effectiveness of the program. A new entry permit will need to be initiated that takes into consideration all new information prior to subsequent entries.

7.4 Ten Basic Rules Applying to Confined Space Entry Work:

- 7.4.1 Competent Person - A competent person shall be assigned to each confined space activity who is capable of anticipating, recognizing and evaluating team member exposure to hazardous substances or conditions and understands the appropriate emergency procedures. A competent person also has authority to cease operations that pose a threat to workers. In most cases, the entry Supervisor will also be considered the competent person for that activity.
- 7.4.2 Emergency Planning – Prior to entry, plans **must** be established which provide for entrant rescue/retrieval from a confined space and the quickest possible medical treatment. Whenever possible, non-entry retrieval equipment should be used for rescue to eliminate the need to enter the space during rescue. Rescue by entry is the last resort and requires the following:
 - A minimum of two members of an approved rescue team available to respond in an emergency within 4 minutes.
 - See Confined Space Rescue Safety Policy and Procedure.
- 7.4.3 Testing of Atmosphere – All testing meters/equipment must be calibrated and checked per the manufacturer's recommendations prior to use. Testing must be accomplished for existing or potential atmospheric hazards. OSHA permissible exposure levels (PEL) shall be followed (see limits listed on permits in SD810 and SD811). Continuous or frequent monitoring shall be conducted and results documented. Monitoring shall continue at planned frequency and may be stopped only if the competent person in charge determines it safe to stop. Permits must identify frequency of testing. As a minimum no less than one (1) air test shall be conducted each shift during which any Cianbro team member is working in the confined space. Oxygen must always be checked first because low oxygen levels affect the combustible gas indicator (LEL meter).
 - Oxygen deficient or enriched atmosphere (Must be between 19.5 and 23.5%, (19.5 and 22.0% for marine work))
 - Flammable or explosive atmosphere (LEL)
 - Toxic atmosphere (H₂S, SO₂, CLO, CO, etc.)
 - Other special conditions

Note: For every 0.1% that the oxygen reading is below the normal reading of 20.9%, something has replaced 1000 PPM of the oxygen. For oxygen readings of 20.5 or below you should investigate what is replacing the oxygen.

- 7.4.4 Lock Out/Tag Out - All electrical and/or mechanical components associated with the confined space must be positively secured. (Pipes blind flanged, breakers padlocked, valves chain locked, etc.)

Note: Since OSHA allows the use of a Tag Out system for general industry, some companies, especially electrical generating facilities, have selected the Tag Out for their program. So long as we are assured positive controls are in place, and a coordinated program with the host is established, "Tag Out" method can be used.

- 7.4.5 Confined Area Entry Permit - Cianbro's Confined Area Entry Permit must be completed and posted at the access entry of the confined space. The permit must identify the time duration it is good for. In most cases, the permit will only be good for one shift. It may also be necessary to coordinate permitting with the host (owner). The host's permit may be used in place of Cianbro's provided all issues and checks required by Cianbro's program are satisfied. At a minimum Cianbro's Confined Space permit will be used for all confined space work, permit or non-permit. Some Non-Permit spaces may only require an initial (one time) permit that is checked off, good for the duration of work.

- For "permit required" confined spaces in general industry, OSHA 1910 Standards must be followed and a sign reading "Danger, Permit Required Confined Space - Do Not Enter" needs to be posted at each access point. Unless the host has additional requirements, inclusion of all Ten Basic Rules listed in this section will adequately satisfy OSHA'S Requirement for Confined Space Work in General Industry.
- Most host employers in general industry have identified their confined spaces as either "Permit required" or Non-Permit required confined spaces.

"Permit required" confined spaces includes the need to log workers in and out of a confined space. Use the log provided on the back of the permit form. Log is optional for non-permit spaces unless need is determined by client or competent person.

- 7.4.6 Hole/Stand-by Watch - A minimum of one person will be assigned sole responsibility for monitoring team members in a permit required confined space to support activities and initiate any emergency actions necessary. New construction like excavations **may not** require hole/stand-by watch.

- 7.4.7 Ventilation - Continuous air ventilation/flow must be adequate. Mechanical ventilation must be used any time welding, burning or cutting operations are being performed in a confined space. Minimize bends, kinks or turns in hoses as this greatly reduces airflow.

- 7.4.8 Tools/Equipment/PPE - Provide for appropriate Personal Protection Equipment for the activity. Explosion proof equipment may be required (GFCI, 12 Volt lights, etc.).

- 7.4.9 Training –

- Confined Space Training
TMs engaged in confined space work as an entry Supervisor, authorized entrant, or authorized attendant (hole watch) must have documented training prior to their first assignment and it is recommended that they have refresher training annually. The training materials can be found on Cianbro.net.
- Confined Space Rescue Team Training
 - Complete 24hr. Confined Space Rescue Training. -One time training
 - Complete 8 hr. refresher competency rescue training including a mock rescue. –Annually
 - Complete an onsite mock rescue
 - Complete medical questionnaire for specific SCBA/SAR approval from our medical director. -Annually
 - Current Pulmonary Function Test (PFT). – Every three years
 - Current FIT test specific for SCBA and SAR – Annually

- Current certification in First Aid and CPR

Conduct training with all persons involved in the confined space work activity prior to starting work and as conditions change. The written activity plan must be developed and reviewed with team members and all aspects/hazards discussed. Team members must sign off on the activity plan to document training was conducted. Team members must be proficient in duties expected of them including how to do non-entry rescue if required. Any changes in the original confined space activity plan must be reviewed with team members.

7.4.10 Recordkeeping - Records must be maintained during the activity and filed following the work at the job site. Records should include at minimum:

- Activity plan
- Permits (minimum of 1 year)
- Training conducted
- Air testing results
- Emergency Action Plan
- Special tests conducted
- Team member signatures of training received
- Log of team members into and out of confined space for "Permit Required" spaces

Confined space work activities can be extremely dangerous and warrant special emphasis on planning. Should there be unusual circumstances or hazards which require special considerations please contact the Safety Department.

7.5 Hole-watch Attendant Duties:

7.5.1 A hole-watch attendant(s) must stay on duty outside a confined space for the duration of the entry. If they have to leave their post, they must contact their foreman so that he/she can replace them with another qualified hole-watch attendant.
NEVER LEAVE A CONFINED SPACE UNATTENDED!

- Duties include:
 - Keep a count at all times of the number of workers in the space. (Some situations may require the use of a written log to control access in and out of a confined space.)
 - Monitor activities both inside and outside the space. Recognize conditions that could turn into a potential hazard for those in the space.
 - Conduct or assist in air quality monitoring functions.
 - Keep continuous contact with those in the space (visual and/or verbal).

7.5.2 Know how to properly use the emergency equipment and practices **WITHOUT** entering the space. **DO NOT ATTEMPT TO GO INSIDE A SPACE TO PERFORM A RESCUE.**

7.5.3 If an emergency arises get help by:

- Sounding the air horn alarm (2 short blasts) or
- Using a 2-way radio or
- Using a cellular phone or
- Having someone go to a nearby phone to contact appropriate emergency response personnel

Have the emergency equipment ready to use. Follow your emergency plan.

7.5.4 Note: In the unlikely event that there is no one else immediately available to contact emergency response personnel, then the hole-watch attendant may leave his/her watch long enough to ensure response personnel are contacted. This assumes that the planned emergency response actions planned for the activity failed, and leaving the hole watch post is a last resort. You should be able to avoid this by providing a radio or cellular phone if an air horn will not work.

7.5.5 The hole-watch attendant has the authority to both fend-off unauthorized intruders and to order entrants out of the space whenever it is necessary.

- 7.5.6 The hole-watch attendant is to order an evacuation of the space in any of the following five situations:
- If they see any condition not allowed by the work permit (i.e., hot work, unauthorized work practices, etc.).
 - If they observe changes in personal behavior that could be the result of oxygen deficiency or over exposure to gases/vapors.
 - If they detect a situation(s) outside the space that might endanger those inside (i.e., a chemical spill, or vehicle idling near the ventilation intake, etc.).
 - If they detect an uncontrolled hazard in the space (i.e., exposed and energized circuit, leaking fluid line, etc.).
 - If they have to leave their post for any reason.
- 7.5.7 A single hole-watch attendant may monitor multiple spaces provided the attendant can keep in continuous contact with those in the spaces (visual or verbal) and plans have been included in the activity plan to ensure emergency response without distractions from the attendant's responsibilities.
- 7.5.8 Confined space emergency rescue equipment:
- Some combination of the following equipment will be required for the confined space situation:
 - Air Horn
 - Vertical Lifeline
 - Body Harness
 - Tripod Retrieval System
 - 2-way Radio
 - SCBA Units
 - Stokes Basket w/rigging
 - First Aid Kit
 - Supplied Air with regulator, air lines and respirator
 - Other items as necessary

7.6 Duties of Authorized Entrants

- 7.6.1 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms and consequences of the exposure.
- 7.6.2 Proper use of equipment and tools.
- 7.6.3 Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as necessary in an emergency.
- 7.6.4 Alert the attendant whenever:
- The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
 - The entrant detects a prohibited condition.
- 7.6.5 Exit from the permit space as quickly as possible whenever:
- An order to evacuate is given by the attendant or the entry supervisor.
 - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
 - The entrant detects a prohibited condition.
 - An evacuation alarm is activated.

- 7.6.6 Wear the appropriate PPE for rescue removal if necessary.
This may include all, or a combination of the following:
- Full body harness
 - Retrieval rope
 - “Wristlets”
 - Flashlight
 - Air monitor
 - Other

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 Documents available on Cianbro.net/Resources/Forms

Confined Space Entry Hazards and Planning Checklist	SD1062
Permit Required Space Worksheet	SD810
Non-Permit Required Space Work	SD811

- 9.2 Please Note: Training manual and exam for presenter and student is located on Cianbro.net under Resources| Manuals| Monthly Safety Training Calendar & Material 9.0 September & 9.1 September & 9.2 September.

Policy Number: 19A**Authorized By:** Michael W. Bennett**Title:** Confined Space Rescue Team**Effective Date:** 09/01/98Page 1 of 13

1 Status

- 1.1 Update of existing policy, effective 05/06/14.

2 Purpose

- 2.1 To define the circumstances under which Cianbro will provide its own confined space rescue services. In addition, provide guidance necessary for the proper training of team members, the proper equipment to use and the proper protocols to follow in the event of an emergency.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Confined Space Entry Rescue: Designated and trained responders enter a confined space to remove team members who have become injured or incapacitated.
- 4.2 Confined Space Non-entry Rescue: Injured or incapacitated team members inside of a confined space are removed by someone external to the confined space.
- 4.3 Confined Space Rescue Team Member: Cianbro team members who volunteer for, and meet the requirements of rescue team membership, and who serve in a pool of qualified people who, when assigned to a project, will be part of the designated rescue team.
- 4.4 Confined Space Rescue Training Requirements: Complete initial twenty-four hour Basic Confined Space Rescue course, which includes First Aid/CPR/AED certification, attendance at Annual Refresher training, participation in periodic rescue drills.
- 4.5 Qualified Confined Space Rescue Instructor: An instructor with formal training/certification in instructional methods who is competent through training and experience in all rescue skills included in the curriculum. Instructors should be provided with opportunities to attend outside training and to develop and maintain a high skill level.
- 4.6 Regional/Business Unit Confined Space Rescue Coordinator: A team member designated by the Business Unit or Regional Vice President to be the person to whom inquiries about rescue equipment, rescue requirements and rescue protocols is directed in that region or business unit. The Regional Coordinator is responsible for working with the Cianbro Institute to coordinate all new and refresher training. The Rescue Coordinator is also responsible for the purchase, deployment and maintenance of confined space rescue equipment. The Regional Coordinator will designate qualified instructors, evaluate outside instructional resources when necessary and will oversee the rescue drills which take place at projects in actual confined spaces.

5 Policy

- 5.1 Any time Cianbro team members enter confined spaces there must be a plan to rescue those team members in the event of an emergency.

6 Responsibilities

- 6.1 The top Cianbro manager on the affected job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Rescue Requirements

- 7.1.1 Any time Cianbro team members enter Confined Spaces there must be a plan to rescue those team members in the event of an emergency. Options include a) Non-entry Rescue or b) Entry Rescue.
- A. Non-entry Rescue means that any team member who enters the confined space may, at any time be removed from that confined space by someone external to the space. Typically this would involve the entrant being connected to a device such as a tripod where an attendant upon recognizing the need to extract the entrant uses the mechanical advantage created by the hoist and removes that team member.
 - B. Entry Rescue means designated and trained responders enter the confined space to remove team members who have become injured or incapacitated. Designated and trained responders may be Cianbro team members, responders supplied by the client, public sector responders, or responders contracted to provide rescue services.

7.2 Rescue Evaluation and Planning

- 7.2.1 Any time work involving confined space entry is being estimated and the work is being planned, the confined space rescue needs must be evaluated.
- 7.2.2 The first issue to be determined is if non-entry rescue techniques may be employed. If non-entry rescue is practical and will be effective for all entrants, the Activity Plan for the work shall convey this to all team members conducting the work and shall spell out the specific equipment needed and the methods to be employed to provide this service should it become necessary.
- 7.2.3 If Entry-Rescue is required the people estimating/planning the work must determine first, the availability of local Confined Space Rescue resources such as a client- or facility-based team, a local municipal/public sector-based team such as the local Fire Department, Ambulance Service or County Rescue Team, or a private rescue standby service. If one or more of these non-Cianbro rescue services are available, they must be contacted and evaluated to determine that they can, in fact, affect a successful rescue if needed as well as assessing their availability and any cost associated with their response. If an outside Service is selected, they must be given an opportunity and be encouraged to examine the entry site and perform a practice rescue. For any work involving IDLH atmospheres, rescuers must be onsite full time during the entry. Utilize 9.1 Appendix A for evaluating outside Rescue Services. Upon completion of the evaluation of outside rescue services a formal decision will be made as to their use and a plan put in place to clarify all expectations and responsibilities.

7.2.4 If local Confined Space Rescue resources are not available or not capable of meeting the rescue needs of our work, Cianbro team members will be selected from the pool of rescue trained team members and used to staff the job making up the Rescue Team for that job.

Note: Cianbro Rescue Team members will be utilized to provide Rescue capability for other Cianbro Team Members working on the project. All other entrants into the confined space ie. Client Representatives, Manufacturer's Representatives and Sub-contractors need to make arrangements for their own rescue service and those arrangements need to be clear prior to entry. If Cianbro is to provide rescue services for other than Cianbro team members a Liability Waiver must be signed and in hand prior to entry into the Confined Space.

7.3 Cianbro Confined Space Rescue Team Membership

7.3.1 All members in the Cianbro Confined Space Rescue Pool are volunteers who have met minimum requirements. Team members do not receive any financial compensation for membership other than occasional opportunities for overtime pay arising from training and work opportunities.

7.3.2 Minimum Requirements for Team Membership

A. Team members who wish to become members of the Confined Space Rescue Pool must:

- Complete a Cianbro Respirator Questionnaire. On the questionnaire they must write on Page one "Requesting Clearance for Confined Space Rescue Team."
- A Pulmonary Function Test (P.F.T.) must be scheduled for the team member if he/she has not had one for three or more years or has never had one. If a P.F.T. has been conducted within the last three years, Cianbro's medical director will review those results, and after reviewing the Respirator Questionnaire, will either grant or deny approval to be on the team.
- Upon approval by Cianbro's medical director, the team member must take the Cianbro Twenty-four Hour Basic Confined Space Rescue class.
- Each Business Unit will be responsible for identifying Confined Space Rescue Team members and to work with the Cianbro Institute in order to complete any necessary training.

B. Team members shall stay current in Confined Space Rescue skills by meeting the following requirements:

- Attend the annual company-sponsored 8-hour refresher training and demonstrate proof of competency.
- Maintain certifications in First Aid and CPR/AED.
- Attend at least two of the four annual skills review sessions scheduled through the Cianbro Institute.
- Participate in job-specific, periodic Confined Space Rescue drills.

7.4 Confined Space Rescue Team Administration

7.4.1 Each of the Cianbro Companies Business Unit or Regional Vice Presidents shall designate a Regional/Business Unit Confined Space Rescue Coordinator. This person must be someone with experience and knowledge of Confined Space Rescue and will be the person to whom inquiries about rescue equipment, rescue requirements and rescue protocols are directed in each region. This coordinator shall be responsible for working with the Cianbro Institute in scheduling and coordinating training, as well as the purchase, deployment and maintenance of confined space rescue equipment.

7.4.2 Any time a Cianbro Confined Space Rescue Team is utilized at a job site, a team leader shall be designated by the Project Manager. The team leader will be responsible to insure that adequate equipment is on site, properly deployed, properly maintained, inspected, and that on-site team members have a plan and know how to implement that plan in the event of an emergency.

7.5 Confined Space Rescue Equipment

- 7.5.1 Cianbro Supply in Pittsfield will maintain rescue equipment kits that are available for deployment where and when needed. These kits will contain a standardized list of equipment which Supply will ensure is present prior to shipping out to a jobsite. If additional or special equipment is needed for a particular job, but is not in the standard kit, purchase of this equipment shall be done at the project location where it is needed in coordination with the Regional/Business Unit Coordinator through traditional purchasing protocols.
- 7.5.2 At least one confined space rescue instructor kit is to be maintained and kept in a central location, determined by the Regional/Business Unit Coordinator, to be available for use in training. The Regional/Business Unit Coordinator shall be responsible for the maintenance of this instructor kit.

7.6 Respiratory Protection Equipment

- 7.6.1 Cianbro Supply in Pittsfield shall have available the proper respiratory protection equipment for the Confined Space Rescue Team. If there is any possibility of a hazardous atmosphere in a confined space, the rescue team shall have on site with the Confined Space Rescue Kit either an adequate number of Self-Contained Breathing Apparatus (SCBA) with spare cylinders or a complete Supplied-air Respirator setup. Self-contained Breathing Apparatus and Supplied-air Breathing Apparatus have specific and detailed inspection and maintenance protocols.
- Cianbro Supply will be responsible for the annual regulator flow test maintenance and the cylinder hydro-test (every 3 years for composite cylinders and every 5 years for aluminum cylinders) maintenance.
 - The jobsite where the respiratory protection equipment is deployed is responsible for the monthly inspections of the equipment and the cleaning and disinfecting of the equipment after use.

7.7 Cianbro Confined Space Rescue Site-Specific Plan Guidelines

- 7.7.1 Define and describe the Confined Space(s) into which Cianbro crews will be entering to conduct work.
- 7.7.2 Designate the Cianbro team members who are to serve as the rescue team.
- 7.7.3 Describe how rescue team members on site will be notified in the event of an emergency.
- 7.7.4 Define where team members are to report upon notification of an emergency and how and by whom "Command" will be established.
- 7.7.5 Designate where all confined space rescue equipment will be stored and describe the means for getting it to where needed in the event of an emergency.
- 7.7.6 Describe the location of and protocol to deploy rescue checklists to ensure that each of the following takes place:
- Conduct a primary assessment
 - Conduct a secondary assessment
 - Make the general area safe
 - Secure the rescue area
 - Enter confined space to remove victim(s)
 - Assess victim(s)
 - Package and remove victims
 - Get victim(s) care as needed
 - Conduct incident termination protocols
- 7.7.7 Describe the process used to ensure that all rescue team members are protected by our company Zero Energy/Lockout Tagout procedures

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments.
- 9.2 Documents available on Cianbro.net/Resources/Forms.

Confined Space Rescue Team Checklist	SD1061
Confined Space Rescue Equipment Kit Checklist	SD1061
Confined Space Rescue Instructor's Kit Checklist	SD1061
Scott Air Pak Monthly Maintenance Checklist	SD1061
Scott Supplied Air Respirator Monthly Maintenance Checklist	SD1061

Non-Cianbro Rescue Service Evaluation

1. What is the name of rescue service?
2. Where is the rescue service located?
3. How is the rescue service notified?
4. Will rescuers be off-site or on-site?
5. Are rescuers or volunteers available 24/7?
6. What is the response time to the work location?
7. Are all the rescuers trained in confined space entry rescue?
8. When was the training?
9. What has been done to maintain competency?
10. Is the rescue service familiar with the work location?
11. Is the rescue service familiar with the work and the specific space(s)?
12. Is the rescue service familiar with entry permits?
13. Is the rescue service familiar with lockout/tagout procedures?
14. Are all rescuers First Aid/CPR certified?
15. Does the rescue service have the equipment necessary to affect a rescue in this space?
16. Does the rescue service have the training and experience to properly evaluate and respond to all hazards that could be confronted in our confined space?
17. Does the rescue service have a written program or policy for responding to confined space emergencies?
18. Can a demonstration of competency be set up for Cianbro to witness?
19. Will the rescue service charge any type of fee? For rescue standby? For an actual rescue? How much?

CIANBRO CORPORATION – Sample* Jobsite Confined Space Rescue: Standard Operating Guideline

Purpose

The purpose of this procedure is to establish general guidelines for conducting confined space rescue operations at a Cianbro jobsite. Job-specific issues need to be addressed in the job planning.

Notification

- A. Staff the job with a minimum of four Confined Space Rescue Trained/Certified Team Members. Use site-specific PMP or Major Activity Plan to ensure that a protocol is in place to ensure that two members of the rescue team are outside of the confined spaces at all times.
- B. Notify all Team Members, sub-contractors and visitors during orientation that an on-site rescue service is present and who that Rescue Team consists of.
- C. Give periodic reminders of the Rescue Protocols at a Weekly Safety Meetings
- D. If a Confined Space Emergency arises, the attendant is to immediately notify the Rescue Team members either verbally, by cellular telephone, or in person.
- E. The Attendant, or other designate person, will call the designated emergency telephone number to report the emergency. When reporting this confined space emergency give as much information as possible including:
 - a. Confined Space Emergency exists
 - b. exactly where the emergency is
 - c. the nature of the emergency
 - d. the approximate number of victims or potential victims
- F. Rescue Team members, upon notification, will respond to the designated location and begin the assessment of the emergency.

The Primary Assessment.

- A. Rescue Team members are to designate a Leader and that Team Leader(Incident Commander) will now be referred to as "Command." Command must confirm that the site emergency number has been called and outside resources are notified and responding.
- B. Upon arrival of outside resources, the Cianbro Incident Commander can relinquish Command to the local authority having jurisdiction (A.H.J.) or establish a Unified Command Structure with that A.H.J.
- C. Determine exactly what has happened. If no there are no witnesses present, look for clues at the incident location.
- D. Assess the potential hazards to rescuers
- E. Attempt to make contact with the victims from outside the space or conduct a quick visual assessment of victims, if possible.
- F. Determine numbers of victims involved

- G. Determine how long the victims have been down, the mechanism of injury, and the survivability profile of the victims.
- H. Determine whether this response is a rescue or recovery.
- I. Locate confined space permit and any other valuable information about the space such as last time atmospheric monitoring was conducted.
- J. Determine the best place to stage equipment, conduct the rescue operations and maintain control of the area by keeping people who don't belong out but in a place where they can be called upon for assistance if necessary

The Secondary Assessment, Command should:

- A. Determine what products are present in the confined space
- B. Determine what types of hazards exist in the space, i.e., atmospheric, mechanical, electrical, etc.
- C. Determine the number and location of victim(s)
- D. Determine entry and exit points
- E. Get the Confined Space Rescue equipment to the location.

Pre-Entry Operations

- A. Make the General Area Safe
- B. Remove obstacles, interferences and make a path to the exit
- C. Stop all unnecessary traffic and shut down any equipment that interferes with the rescue or communication
- D. Establish ventilation to the general area, if necessary

Secure the Rescue Area

- A. Prepare to enter the space to perform the rescue
- B. Determine hazards and products contained in the confined space
- C. Conduct atmospheric testing in the space to determine oxygen level, flammability, and toxicity. Based on readings, determine the proper level of personal protective equipment. Remember: At O₂ readings below 12%, the LEL reading will not be accurate.
- D. Verify that all utilities, including electrical, gas water, or other liquids, and manufacturing/processing equipment are locked out. If it is not possible to lockout/tagout, post a guard to assure utilities/equipment is not turned on during the operation.
- E. Evaluate the structural stability of the confined space. If there is a potential for collapse, appropriate measures must be taken to assure the structural stability of the space.

Ventilation

- A. Determine the ventilation needs for the confined space and select the proper type of ventilation.
- B. Consider the effects on the atmosphere that positive or negative ventilation will have (i.e., increase or decrease flammability of atmosphere). Positive or negative ventilation (pushing or pulling) may be necessary.

- C. Consider negative pressure ventilation if there is only one entry point. Atmospheric monitoring will be required to ensure a non-explosive environment is present in the exhausted vapor area.
- D. Consider the effects the exhaust is having on the operation.

Entry Operations - Victim Removal

I. Selection of Personnel

- A. Designated rescue-trained personnel shall make entry into the confined space. A minimum of two persons should be assigned to make entry.
- B. Command **shall** assure that for every person making entry into the confined space, there is at least one rescuer appropriately dressed and ready as a back-up or are on the way.
EXAMPLE: Two rescuers; two back-ups.
- C. If the atmosphere is I.D.L.H. a two person back-up team **MUST** be dressed and ready to enter prior to any rescuer entry into the confined space.

II. Selection of Personal Protection Equipment

- A. Adequate personal protective equipment will be worn by all entry and back-up personnel. This shall include hard hat or helmet, gloves, proper footwear, full-body, Class III rescue harness and eye protection. Additional potential hazards identified in advance will dictate additional PPE that might include goggles and/or Nomex jumpsuits.
- B. All entry and back-up personnel **shall** wear Supplied-air Breathing Apparatus or Self-contained Breathing Apparatus when making entry into the confined space to perform a rescue unless there is no atmospheric hazard AND no potential for an atmospheric hazard.
- C. If entry personnel use an SCBA, they **shall** enter no farther than one half the amount of supplied air minus 500 pounds.
EXAMPLE: 2216PSI tank gauge pressure – ½ = 1,108 PSI minus 500PSI = 610 PSI usage.
- D. Entry personnel shall carry at least one 4-gas air monitoring device

III. Communication and Lighting

- A. If the confined space has a flammable atmosphere or the potential for a flammable atmosphere has been identified in advance, entry personnel shall have intrinsically safe or explosion proof communication equipment. If this equipment is not available, the rescuers may decide to use a tag line for communication or a message relay person.
- B. If the entry team is entering a dark confined space the proper type of lighting is used. If explosion proof lighting is not available, then cyalume type lights must be used by the entry team.

IV. Orientation of Confined Space

- A. Part of rescue pre-planning and prior to the entry into the confined space, the rescue team with the help of the responsible party, should obtain a blueprint or diagram of the space. All entry and back-up personnel should be made aware of the layout of the space to be entered.
- B. All entry and back-up personnel, Command, and Safety shall be made aware of the action plan and the back-up plan prior to entry.
- C. Rescuer tag lines may or may not be appropriate in the confined space, depending on the specific layout. There could be an entanglement hazard. Whenever possible the entry team should trail masonry string as a means to find their way back out

V. Victim Removal Equipment

- A. If possible, the entry team should bring a supply of breathable air for the victim.
- B. Rescuers should not remove their breathing apparatus and give it to the victim.
- C. Entry team should consider the necessary victim retrieval equipment prior to entry. This includes respiratory protection for the victim.

VI. Assessing Condition of Victim

- A. Upon reaching the victim, entry personnel should do an immediate primary survey of the victim. If appropriate, treatment should be started immediately.
- C. A quick but thorough secondary assessment of the victim should be done. If time permits, entry personnel should attempt to treat serious injuries prior to removal. Realize, however, that the type and extent of treatment you can provide can be severely limited depending on the level of protective clothing and equipment worn by rescuers.
- D. If indicated, complete C-spine precautions should be administered. NOTE: Because of the difficulty removing the victim from the space, optimum C-spine precautions may not be possible.
- E. If the victim is conscious, he/she should be encouraged to wear the appropriate breathing apparatus if a respiratory hazard is present or could become present.

VII. Patient Packaging

- A. After treatment of immediate life threatening injuries, the victim(s) should be packaged for removal. This may include using a backboard, stokes basket, SKED stretcher or some other similar device designed for extrication.
- B. Prior to removal from the space, the entry team should secure any loose webbing, buckles, straps, or any other device that may hinder the extrication process.

VIII. Victim Removal System

- A. Prior to removal of the victim, the entry team, either through pre-planning or while rescuers are approaching the victim, should have determined the appropriate method of extrication.
- B. As a general rule, entry personnel should never allow the victim between the rescuer and the point of egress. This may not always be possible, as in the case when one rescuer has to pull the victim while the other rescuer pushes the victim. NOTE: If the victim is obviously deceased, the Rescuers need to notify Command and a decision can be made as to whether or not to leave the body and related equipment in place for investigative purposes.

IX. Transfer to Treatment Sector

- A. Immediately after reaching the point of egress, entry personnel shall transfer the victim to the medical treatment personnel.
- B. If the victim is contaminated with any type of chemical, the victim shall be decontaminated prior to transport.

X. Termination

I. Preparation for Termination

- A. Assure all personnel are accounted for.
- B. Remove tools and equipment used for rescue/recovery.

- C. If entry personnel and/or equipment have been contaminated by a hazardous material, decontamination procedures shall be followed
- D. Secure the scene. Prior to turning the property back over to the responsible party.
- E. Conduct an incident debriefing prior to dismissing involved personnel.
- F. Command may consider activating the CISD Team.

Additional Considerations.

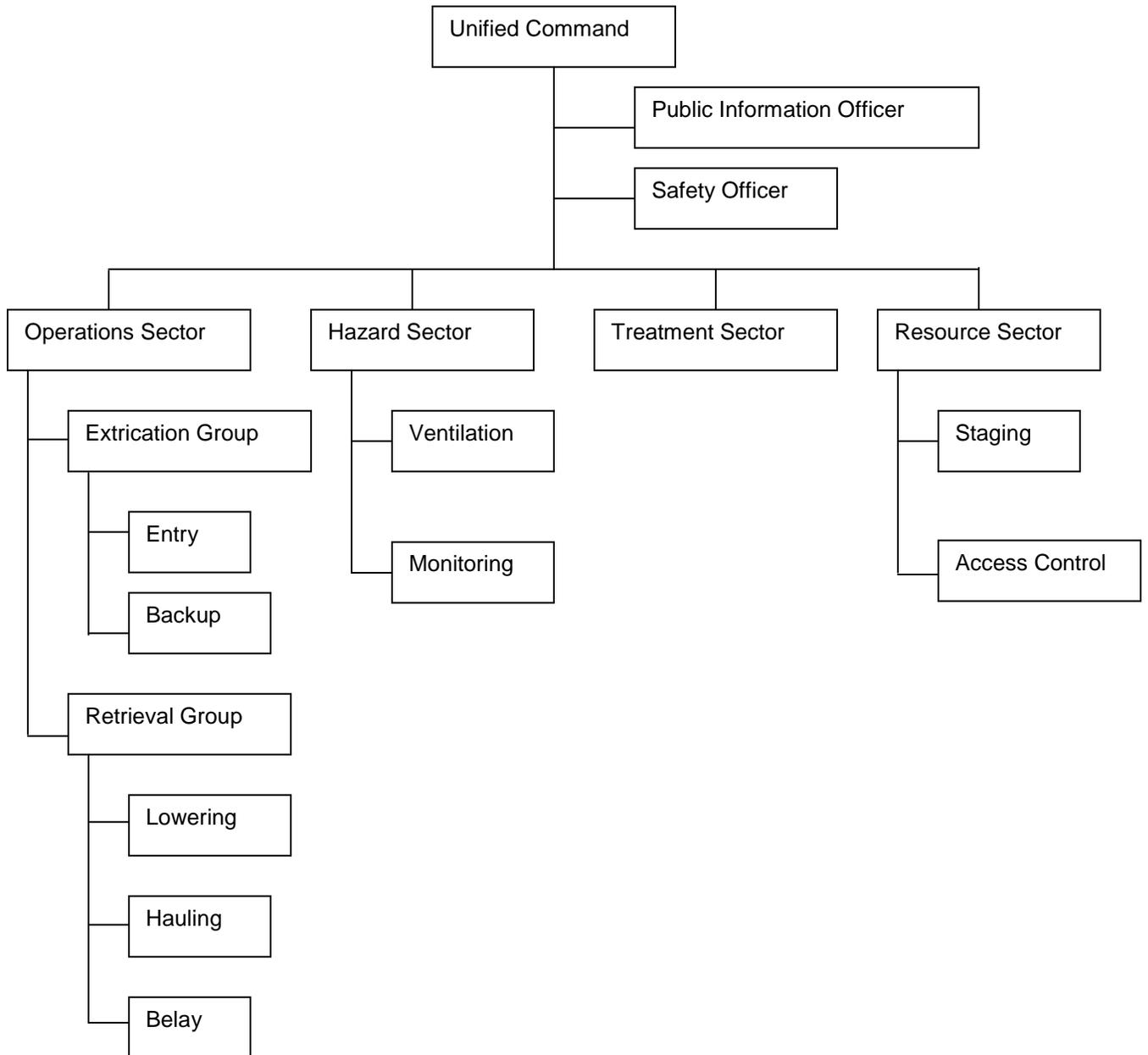
I. Establish Command Early

- A. Assure **Safety Sector** responsibilities are accomplished.
- B. Assign **Access Control Officer** from bystanders or on-site Non-rescue personnel.
- C. Assure **Ventilation Sector** responsibilities are accomplished.
- D. Assure **Extrication Sector** responsibilities are accomplished.
- E. Assure **Hazard Sector** responsibilities are accomplished
- F. Assign **Treatment Sector** when medical resources arrive.
- G. Assure **Staging Sector** responsibilities are accomplished.
- H. Assure **Resource Sector** responsibilities are accomplished.

II. Consider Ambient Conditions

- A. Heat - Consider rotation of crews.
- B. Cold - Consider effects of hypothermia on victim and rescuers.
- C. Rain - Consider the effects of rain on the hazard profile.
- D. Time of day - Is there sufficient lighting for operations extending into the night?
- E. Consider the effect on family and friends; keep family informed.
- F. Consider news media; assign a Public Information Officer to be the sole Media Contact
- G. Command should call Corporate and/or an OSHA representative if there has been a serious injury or death.

Emergency Command Flowchart



Policy Number 020**Authorized By:** Michael W. Bennett**Title:** Electrical Safety and Arc Flash Protection**Effective Date:** 04/18/94Page 1 of 11

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 Provide installation and maintenance procedures for temporary power equipment and systems and identify requirements and procedures for energized work and arc flash personal protection.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Arc Flash / Blast: A dangerous condition of extreme heat (energy) created by an electrical explosion. (A secondary dangerous condition resulting from an electrical explosion would be molten and solid metals and plastics.)
- 4.2 Arc Flash Hazard: A dangerous condition associated with the possible release of energy caused by an electric arc.
- 4.3 Arc Flash Protection Boundary: An approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical flash were to occur. The arc flash boundary for systems which are 600 volts or less shall be a minimum of four feet unless specifically calculated.
- 4.4 Arc Rating: The value attributed to materials which describes their performance to exposure to an electrical arc discharge. FR clothing without an arc rating has not been tested for exposure to an electric arc. The language previously used in NFPA 70E which specified 'FR'- Flame Resistant PPE, has been revised as 'AR'- Arc Rated PPE.
- 4.5 Bonded: Connected to establish electrical continuity and conductivity.
- 4.6 Class A device (GFCI): A device that is designed to trip between 4 and 6 mA and is intended for personnel protection rather than equipment protection.
- 4.7 Competent Person: A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measures to eliminate them.
- 4.8 Energized: Electrically connected to, or is, a source of voltage.
- 4.9 Exposed To: Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to electrical conductors or circuit parts that are not suitably guarded, isolated, or insulated.

- 4.10 Arc Flash Hazard Analysis: A study investigating a workers potential exposure to arc-flash energy, conducted for the purpose of injury prevention and the determination of safe work practices, arc flash boundary and the appropriate levels of PPE.
- 4.11 Ground Fault Circuit Interrupter (GFCI): A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds the values established for a Class A device.
- 4.12 NEC (NFPA 70): National Electrical Code is the standard for electrical installations.
- 4.13 NFPA 70E: National Fire Protection Association (publication) 70E is the Standard for Electrical Safety in the Workplace.
- 4.14 Qualified Person: One who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved.
- 4.15 Voltage: The greatest difference of potential between any two conductors of a circuit.
- 4.16 Working On: In contact with energized electrical conductors or circuit parts with the hands, feet, or other body parts, with tools, probes, or with test equipment regardless of the personal protective equipment a person is wearing.
- 4.17 Risk Assessment: A process that identifies hazards, the likelihood of occurrence and determines the protective measures required.

5 Policy

- 5.1 When temporary electrical equipment and systems are installed and maintained, or when any temporary or permanent energized work occurs, Cianbro will meet applicable OSHA standards, the NEC and NFPA 70E requirements.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible electrical safety and arc flash protection under this policy.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.
- 6.3 Corporate Safety is responsible for maintaining this document.

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7.1 On our construction projects, we widely use temporary power and portable tools. Risk of exposure to electrical hazards increases when cords, cord connectors, cord and plug connected equipment, and receptacles are improperly used and maintained. Generally, flexible cords are more vulnerable to damage than other electrical equipment and deserve special attention. Specific training is required for team members for tasks ranging from operating a 120 V breaker to working in cabinets with exposed energized parts by qualified electricians.

7.2 Training

7.2.1 All team members must be trained in the requirements of this policy.

7.2.2 Team members who are required to work within the limited approach boundary as defined in NFPA 70E must be qualified and have additional training. These team members are identified on the Electrician Master List which is found on Cianbro.net. See 050 Electrical Operations Program Safety Policy and Procedure for specific training topics required.

7.2.3 Training shall include identifying and understanding the relationship between the electrical hazard and potential injury.

7.2.4 Training shall be documented with name, date, trainer, and content and sent to the Cianbro Training Center for retention through entry into our system.

7.3 Ground Fault Circuit Interrupters (Class A GFCI) for Personnel Protection

7.3.1 The Ground Fault Circuit Interrupter (GFCI) is a fast-acting circuit breaker that senses small imbalances in the circuit (between 4 and 6 milliamps) caused by current leakage to ground and in a fraction of a second shuts off the electricity. The purpose of the Class A GFCI is to provide protection from electrical shock to the user.

- A. Class A GFCI protection is required on all 120-volt single-phase 15, 20, and 30 amp receptacle outlets. The GFCI plug receptacles, panel breakers or cord pigtails must be in place before using a cord set so the cord set and all down stream loads are protected.
- B. All 120 volt 15, 20, and 30 amp single-phase outlets, cord sets, and cord and plug connected equipment shall be protected by Class A GFCI.
- C. GFCI devices like plug receptacles or cord pigtails are required to be tested each day before use. This is to be done by the person using the GFCI. The test is performed by pushing the test button on the GFCI, the reset button will pop out and the electricity will be shut off. This will be verified by having the user plug a tool or light into the GFCI, turn the tool switch on and make sure there is no power to the tool. A competent person may also verify by using a voltmeter to make sure there is no power. A plug-in GFCI tester can be used to test the device for proper trip functions. If the button does not pop out, take the GFCI out of service either by tagging it out or if it's a portable device, tag it out of service (out of order, damaged, etc.) and return it to the tool crib for proper disposal.

- D. GFCI circuit breakers located in electrical panels used to protect outlet circuits and permanently mounted GFCI receptacles must be tested monthly, after a violent thunderstorm, a power outage, or more often if required by the manufacturer. These tests shall be documented. Know what systems are protected that may be in use, before checking a GFCI breaker or cord pigtail device.
- E. OSHA requires testing of GFCI devices used for personnel protection.
- F. Refer to Cianbro Electrical Operations Program for GFCI testing procedure.

7.4 Power Cord Inspection Program

7.4.1 Cianbro has a power cord inspection program that requires inspection of all outlets, cord sets, and cord/plug connected tools and equipment cords before use.

7.4.2 Implementation of this program is the responsibility of the supervisor in charge. It is the responsibility of every team member to verify that each cord set (extension cord) and any equipment connected by cord and plug is visually inspected before each day's use for defects such as deformed or missing prongs, damaged insulation, indications of possible internal damage or incorrect quarterly identification. Equipment found damaged shall be removed from service, tagged, and not used until repairs have been made by a qualified person.

7.4.3 The project manager/superintendent or supervisor in charge shall ensure a qualified person is assigned the responsibility to conduct quarterly inspections of all outlets, cord sets, and cord/plug connected equipment. This specifically includes 240 and 480 volt cords and all other cords but does not include those cords that are 120 volt single-phase 15, 20, and 30 amps or those cord sets in storage. The following tests and inspections shall be performed.

- A. Conduct visual inspections for external defects and possible internal damage.
- B. With the use of testers, test to determine correct connections and whether or not the outlet, cord set, or cord/plug connected equipment is properly grounded.
- C. Physically open the cord connector assembly and verify that there is no visible damage and the cable is properly terminated. This step is subject to the electrical supervisor's discretion if cords are not removed from service and are only being checked for the quarterly ground assurance.
- D. Inspections and tests must be performed before first time use, (new equipment or cords) before equipment is used following repairs or suspected damage, before equipment is put into service and after arrival at any jobsite, and before every quarter of each calendar year.
- E. Rental or other equipment shall also be inspected and tested in the same way.

7.4.4 Quarterly checks and tests must be accomplished and documented by using the proper colored electrical tape wrapped around the cord approximately three to six inches from the male plug end. Remove old quarter tape before applying new color tape.

A. Equipment shall be marked as follows.

Test/Inspection Month	Quarter	Tape Color	Memory Code
December	Jan, Feb, Mar	White	Snow/Winter
March	Apr, May, Jun	Green	Grass/Spring
June	Jul, Aug, Sep	Red	Hot/Summer
September	Oct, Nov, Dec	Orange	Foliage/Fall

- B. Remove old tape and apply new color each quarter.
- C. Double-insulated tools, other than 120 volt single-phase 15, 20, or 30 amp, should also be taped in the same manner to document that a visual inspection has been done.
- D. Electrical equipment that remain in a fixed location like a field office trailer; do not have to be checked per this power cord inspection program.

- E. Quarterly intervals shall not exceed three months. In order to ensure turnover from quarter to quarter, tests and inspections should start during the month prior to the start of the new quarter and should be completed by the first day of the new quarter.
- 7.4.5 Subcontractors must also show evidence of their assured equipment grounding conductor (AEGC) or GFCI program and method of documenting inspection or checks. They may adopt our electrical program; however, they shall be fully responsible for inspection/testing and controlling their equipment.
- 7.4.6 Repairs to cord sets or the electrical components of power tools must be made by a qualified electrician. This includes plug and cap connections. The only exception to this is that qualified persons other than electricians may also make repairs to 120 V cord assemblies (repairs to cords and plugs, not internal repairs to power tools) if they have been approved through the procedure contained in SD1070, which can be found in the SOP.
- 7.4.7 See 9.1 Appendix A for Cianbro Wiring Procedure for Portable Cords.
- 7.4.8 See SD1070 for Authorized Electrical Cord Repair Person Requirements.
- 7.4.9 Cable Stripping methods and tools require special planning to avoid personal injury from cuts.
Specialty cable/wire stripping tools shall be used whenever possible.
Some cable stripper tools that work well are:
- A. MK01A, ABECO- cable stripper, 3/8 to 1 inch diameter cable
 - B. Ideal 45-129 - cable stripper, for larger size cables
 - C. Rotastrip ABECO - cable stripper, works well, blades will brake
 - D. Stripmaster - cable stripper, works well, less fatigue to wrist
 - E. Reflex T, - cable stripper, works well, light and easy to use
- 7.4.10 Only as a last resort and as determined to be a safer method, shall utility or personal knives be used. A job hazard analysis (JHA) must be completed and justification documented in the activity specific plan allowing the use of utility or personal knives.
- A. Cut resistant sleeves and cut resistant gloves shall be used for all cable and wire stripping when using a utility or personal knife.
 - B. Proper instructions/training shall be given on how to safely strip cable/wire.
 - C. Refer to Safety Policy and Procedure Numbers 017 – Hand and Finger Protection and 031 – Personal Protective Equipment for additional information in regard to working with sharp tools or objects.
- 7.5 Portable Electric Generators/Welders/Light Stands
- 7.5.1 Portable electric generating equipment shall be equipped with GFCI's or portable plug-in GFCI's shall be used.
- 7.5.2 Under the following conditions, the frame of the generator does not need an external ground (such as using a ground rod) if:
- A. The generator supplies only equipment mounted on the generator such as light stands, arrow boards, welders, etc. and/or plug and cord connected equipment.
 - B. When mounted on a vehicle or barge, the frame of the generator is bonded to the frame of the vehicle or barge, and the generator supplies only equipment located on the vehicle and/or cord and plug connected equipment.
 - C. The generator is bonded to its supporting frame and if on a trailer or vehicle to the frame of the trailer or vehicle.
- 7.5.3 In all other cases, generators shall be grounded by a ground rod or connection to the building grounding system as required.

7.6 Temporary Lighting

- 7.6.1 Temporary area lighting is required to be supplied by its own circuit. Temporary lighting circuits are not to be used for any other purposes.
- 7.6.2 Portable electric lighting used in wet or other conductive locations such as drums, tanks, and vessels shall be low voltage (12 volts or less) or 120 volts protected by GFCI's.

7.7 Special Conditions

- 7.7.1 Written activity plans must be developed which address the specific work to be accomplished and all electrical hazards associated with it. Activity plans should be based on inspection of the work area and a risk assessment of identified hazards including "Process Safety Management" (PSM) consideration. A competent supervisor must be assigned to coordinate planning and monitor activities. Activity plans must be communicated with all persons associated with the work to be involved prior to the start of work.
- 7.7.2 Unanticipated or Unique Electrical Hazards
 - A. Unique electrical hazards created during work performed by Cianbro team members shall be reported to the client including what measures are in place to control the hazard.
 - B. Unanticipated electrical hazards identified during the work activity shall be reported to the client including what measures are in place to control the hazard and to prevent the hazardous condition from reoccurring.
- 7.7.3 Work on Energized Panels or Equipment
 - A. Electrical equipment must be de-energized, tested, and positively locked-out in accordance with our Zero Energy State Safety Policy and Procedure prior to conducting any work on or around it ("Tick Tracers" are not to be used when verifying zero energy state.) Energized work will only be done, as an exception, when the work cannot be done with the equipment in an electrically safe working condition.
 - B. Team members approved for performing energized electrical work shall be trained in safe work practices and procedures in accordance with NFPA 70E, at intervals not to exceed 3 years. Retraining will be conducted as per NFPA 70E requirements.
 - C. Only electricians approved by the Cianbro Electrical Committee and designated as persons qualified to work on energized electrical parts are authorized to perform work in energized panels or equipment. This includes testing, troubleshooting and voltage measuring within the limited approach boundary for shock protection. For work on or near energized electrical parts, reference NFPA 70E Article 130.2(A) "Energized Work". Unqualified workers are not allowed in these areas unless the space has been placed in an electrically safe working condition.
 - C. Completion of a Cianbro Energized Work Permit is required. A detailed activity plan developed with review and input by a qualified electrician is also required. Required PPE and insulated tools (with current inspection date if applicable) must be used by the qualified electrician when working on or around energized circuits where incidental contact or an arc flash could occur.
- 7.7.4 Work on energized circuits will require using specialized equipment and protective clothing following OSHA, NEC, and NFPA 70E guidelines.
 - A. All insulating personal protective equipment must be inspected before use each day and after any incident that could possibly have damaged the PPE.

- B. Rubber insulating PPE must be tested periodically. Refer to 050 Electrical Operations Program Safety Policy and Procedure for specific intervals (not to exceed 6 months for gloves or 12 months for other insulating PPE).
- 7.7.5 Work on or adjacent to energized circuits in confined spaces or enclosed areas with limited space will require the use of protective shields, barriers, or insulating materials to prevent team members from inadvertent contact. Ladders used for access to such areas must be non-conductive. Protective barriers must also be considered if team members are required to work with or handle conductive materials adjacent to electrical hazards. Adequate lighting must always be provided in areas that contain energized electrical parts. Team members may not enter spaces containing exposed energized parts, unless illumination is provided that enables the TMs to perform the work safely. TMs may not reach blindly into areas which may contain energized parts.
- 7.7.6 There must be a minimum of two Cianbro team members, one being a qualified electrician, working at all times in an Electric Room when panels are open. No team member will ever be left alone.
- 7.7.7 All other work in an Electric Room will be evaluated for electrical hazards by a qualified electrician. If electrical hazards are not found to exist, work may proceed until change in conditions occurs. Should a change in conditions occur, work will be stopped and be re-evaluated by a qualified electrician.
- 7.7.8 Fifty (50) amp cord caps and connector bodies for both 480v and 240v cord connections used in temporary power systems are subject to failure under various environmental conditions. Items such as moisture and dust penetrate the plug's terminals and contacts. Several considerations for protection against failure are as follows:
- A. Temporary systems can be hard-wired very cost effectively, eliminating plug-in connections completely.
 - B. Cords may be custom made by a qualified person (in the field or in Pittsfield) where long runs are needed in order to eliminate plug-in connections.
 - C. Locate plug-in connections out of wet/moist areas.
 - D. Keeping plug-in connections above floors or ground.
 - E. Cover plug-in connections to allow water to run off without contacting the plugs.
 - F. When plug-in connections must be used in a moist/wet environment, watertight devices listed for the purpose must be installed and connections must be covered in a manner which will allow water to run off.

7.8 Electrical Surveys

- 7.8.1 The following should be surveyed routinely:
- A. Are electric panels completely and accurately labeled? Panels greater than 600 volts between phases shall be labeled "High Voltage". Is each circuit accurately labeled? Is the required Electrical Hazard warning clearly visible?
 - B. Are electric panels clearly accessible and not blocked off?
 - C. Are electrical boxes and panels properly located, supported, covered, and openings sealed (no open holes)?
 - D. Are all light bulbs properly covered, guarded, and not broken? Metal guards must be grounded as required by National Electrical Code.
 - E. Are power cords routed up and out of travel ways?
 - F. Are lugs and leads on electric welders properly insulated?
 - G. Are Cianbro conex boxes correctly wired to the Cianbro standard? (Available from Cianbro Equipment LLC.)
 - H. Are buried cables properly flagged and signed?
 - I. Have overhead power lines been marked for work that requires cranes to be in the area?
 - J. Are installations and modifications of electrical equipment being performed only by licensed electricians and qualified persons?
 - K. Does this site have electrically safe working conditions? Has a detailed activity plan been developed? Has the Cianbro Energized Work Permit been filled out if

- energized work must be done? Does this site have electricians qualified to do energized work and certified by the Electrical Safety Committee?
- L. Are insulated tools and protective clothing and equipment available for work on energized systems?
 - M. Has protective equipment and clothing been inspected each day before use for rips, tears, and damage? (See Safety Policy and Procedure 050.)
 - N. Do environmental conditions exist which create the conditions of working in or around water? (Rain, snow, foggy conditions).
 - O. Are all electrical receptacles, covers, and cord plugs intact and free from cracks?
 - P. Old style Cianbro 240/480 volt distribution boxes should not be used in wet environments unless covered or protected.
 - Q. New style Cianbro 240/480 volt distribution boxes must be used with the covers closed at all times other than when installing or removing a cord. Extension cords must enter from under the box and not through the side where they would be subject to damage by the cover.

7.9 Cianbro Arc Flash Protection Policy and Procedure

7.9.1 Cianbro team members and subcontractors shall perform work on electrical equipment and circuits in a de-energized (electrically safe) state if at all possible. NFPA 70E will be referenced to determine proper procedures and required PPE when energized work is performed. In addition, an energized work permit including a risk assessment is required to be completed with appropriate signatures.

7.9.2 See SD1063 for Cianbro Energized Electrical Work Permit available on Cianbro.net>Standard Operating Procedures – SOP.

7.9.3 Arc Rated Garments

A. Team members working on energized electrical equipment or circuits, or exposed to the hazards of an electrical arc flash, shall wear long sleeved Arc Rated shirt, pants and/or outer garment designed to meet the requirements of NFPA 70E Table 130.7(C) (16) Personal Protective Equipment (PPE).

B. Proper Inspection, Use, and Care of Arc Rated Garments

Arc Rated clothing is intended to be used while team members are within the Arc Flash/Blast boundary, and not as a part of their daily working attire unless otherwise specified.

This clothing is to be purchased and maintained by Cianbro.

Proper inspection and use is the responsibility of the user.

1. Inspection:

- Inspect the garment thoroughly for cleanliness
- Be sure there are no stains in garment as this could indicate the presence of contaminants.
- Check for embedded foreign materials or foreign fibers.
- Inspect for excessive wear, or torn fabric before each use.
- Look for signs of repair such as stitches, patches etc.
- Check hood shield or face shield for damage and for excessive scratches which could limit visibility.
- **Do not use the garment if it does not pass inspection.**

2. Use:

- **Be sure to fasten all closures to eliminate the possibility of skin exposure to an Arc event.**
- Be sure to use the correct Arc Rated garment for the task, as per NFPA 70E requirements.

- Take care not to snag or tear the fabric, as it cannot be repaired by conventional means. The integrity of the garment will be jeopardized by repairs with inferior materials. If damaged **remove it from service.**
 - If garment is exposed to an arc event, **remove it from service.**
 - Take care not to expose the garment to oils and grease which could be absorbed into the fabric, causing it to burn if involved in an arc event.
3. Care and Cleaning:
- Follow manufacturer's recommendations for proper care and cleaning.
 - Be sure that the garment is washed after using. Hygiene can become an issue when garments are shared by team members.
 - Do not wash Arc Rated garments with other garments, as this can cause foreign material to become embedded in the Arc Rated fabric.
 - Do not use fabric softeners, or bleach while cleaning these garments.
 - Store the garments in a clean container, and in a safe location.
 - Be sure to protect face shields from scratches and other damage while storing them.
- 7.9.4 When exposed to electrical hazards, team members shall not wear conductive articles such as key or watch chains, rings, wristbands, necklaces or other jewelry, or belt buckles which could come into contact with energized parts unless such articles are covered to prevent contact.
- 7.9.5 Team members whose job classification may require them to work on, or be exposed to, energized equipment or circuits and wear Arc Rated garments shall be prepared to do so. The team member should not need to leave the job site to change clothing in order to be in compliance. Arc Rated coveralls, suits, or other garments, where warranted, shall be added over acceptable cotton or other natural fiber work clothing at the job site.
- 7.9.6 Electrical Arc Hazard boundaries shall be delineated and marked by red barricade tape with appropriate information tags.
- 7.9.7 Flash Protection Matrix
- A. When working on or near energized electrical equipment within the Electrical Arc Hazard protection boundary, we will follow the guidelines in NFPA 70E Table 130.7(C)(16) - Personal Protective Equipment (PPE).
 - B. Work Beyond PPE level 4 should not be undertaken due to the extreme nature of forces which would be present.
- 7.9.8 Fall Protection PPE
- A Fall protection shall be arc rated for the applicable PPE level.
 - B. Specific information on products can be obtained from manufacturers such as DBI/SALA-Fall Protection.
- 7.9.9 Testing
- A. Testing requires PPE and tools suitable for the equipment or circuits being tested.
 - B. The proper test instrument must be chosen. Test instruments, equipment, and their accessories will meet the requirements contained in *ANSI/ISA-61010-1-Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1 General Requirements*, for rating and design requirements for voltage measurement and test instruments designed for use on electrical systems 1000 volts and below.
 - C. For voltages over 50 volts, the test instrument shall be verified both before and after an absence of voltage test is performed (Live, dead, live test). The person performing the test must be qualified according to the guidelines in 050 Electrical Operations Program Safety Policy and Procedure.
- 7.9.10 High Voltage Line Work
Refer to 046 Electrical Transmission and Distribution Safety Policy and Procedure.

7.9.11 Switchyard and Substation Work
Refer to 051 Electrical Substations Safety Policy and Procedure.

7.10 Safety At Home

7.10.1 OSHA estimates that approximately 1000 electrocutions occur annually in the home. This is around three times the number of electrocutions in the workplace. One of the key contributors is that people are generally complacent when it comes to using electrical appliances and tools at home. They feel they are in a "Safe Zone" and never give safety a thought. The fact that the use of electrical equipment has increased, combined with the frequent use of equipment by basically untrained people has done much to increase the risk. As construction workers we should strive to set a good example of safety in the home even though we may feel that it is a "Safe Zone".

7.10.2 Following are several examples which could eliminate the possibility of electric shock or electrocution.

- Use GFCI protection whenever we use electrical equipment outside, near plumbing fixtures, in damp basements, near swimming pools, etc.
- Test each GFCI device based on the manufacturer's recommendation at a minimum.
- Understand which outlets are required by the National Electrical Code to be GFCI protected.
- Take steps to ensure that electrical outlets are protected from contact by children, and explain the hazards to them.
- Disconnect power when working on any portion of a circuit.
- Unplug cords when working on tools, equipment, or lights (even when changing a light bulb).
- Avoid cutting trees that are within reach of a power line.
- Avoid using aluminum ladders or lifts near power lines.
- Avoid working near service drops without involving the power company for advice and protection.
- Determine the location of buried cables prior to digging with a machine or by hand.

8 Budget / Approval Process

8.1 Purchase and maintenance of company supplied tools and equipment is the responsibility of Cianbro Equipment, LLC.

8.2 Arc Rated Clothing

8.2.1 Electricians engaged in normally de-energized installations are not required to furnish AR clothing. Projects will furnish and maintain required AR clothing as needed.

8.2.2 Electricians, utility line workers and any personnel that work in energized substations are subject to the Cianbro Arc Rated Clothing policy.

8.3 Cost of following this policy is the responsibility of the projects.

9 Related Documents

9.1 See attachments

9.2 Documents available on Cianbro.net or Cianbro.net>Standard Operating Procedures - SOP

Authorized Electrical Cord Repair Person Requirements	SD1070	SOP
Energized Work Permit	SD1063	SOP

- 9.3 Please Note: Training manual for presenter and student is available on Cianbro.net>Standard Operating Procedures – SOP. 11.0 November_Electrical_&_ZES and 11.1 November_Electrical_&_ZES.
- 9.4 Authorized Electrical Cord Repair Person Exam located on Cianbro.net / Resources / Forms.

Policy Number: 021**Authorized By:** Michael W. Bennett**Title:** Eye and Face Protection**Effective Date:** 09/01/94Page 1 of 6

1 Status

- 1.1 Update of existing policy, effective 02/06/15.

2 Purpose

- 2.1 To eliminate the possibility of an eye injury.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Donning and Doffing: Putting on and taking off the protective clothing or PPE.
- 4.2 Double Eye Protection: The use of two means of eye protection during any activity where projectiles (slag, filings, chips, dust, sprays, spatters, etc.) may result from the activity. This means safety glasses and a face shield or the use of goggles and a face shield.
- 4.3 Full Coverage Face Shield: A face shield assembly that attaches to a hard hat, wraps around the side of the face, and includes a clear chin cup. Note: The "Big Blue" Sellstrom faceshield can continue to be used (until we have used up all that we currently own) in situations where the solid blue chin cup does not create a greater hazard. In those cases, a faceshield with a clear chin cup or other method must be used instead.
- 4.4 Full face respirator: In this context, any respirator that completely covers the face including tight fitting and non-tight fitting models if rated for impact protection
- 4.5 Goggles – Eye protection held on with a strap designed to hold them tight to the face without any gaps. They are typically larger than regular safety glasses or tight fitting safety glasses. Some are designed for splash protection.
- 4.6 Mesh faceshield: A faceshield that is mesh like a screen door. It must provide good coverage on the side of the face and be at least 7.5" long from top to bottom measured in front of the face.
- 4.7 Safety glasses: Safety glasses or prescription safety glasses that meet ANSI Z87 – 1989 or ANSI Z87 - 2003 standard and are equipped with side shields. The glasses must have been checked to ensure good fit around eyes, cheeks, and brow
- 4.8 Tight fitting safety glasses: A hybrid of safety glasses and goggles, they look like safety glasses and are held on with a strap designed to hold them tight to the face without any gaps
- 4.9 Windy Conditions: Conditions are considered windy if the wind, wind gusts, or other air movement is capable of lifting particulate into the air, typically 15mph or above. Goggles or tight fitting safety glasses are required instead of regular safety glasses if windy conditions exist and there is particulate present to become airborne.

5 Policy

- 5.1 The use of appropriate safety eyewear is required on every Cianbro Companies work site with the exception of office and lunch areas.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of any requested variance under this policy unless spelled out in the policy.
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project and for approving alternate eye and face protection when the requirements of this policy create a greater hazard.
- 6.3 The corporate safety department is responsible for maintaining this document.

7 Eye and Face Protection Index

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7.1 Minimum Standards for Eye Protection - The most important action to protect our team members' eyes and face is to do a thorough hazard analysis and identify effective controls. Regardless of what the policy says, we must identify the risk and provide the proper level of protection necessary to protect the team member.

7.1.1 All persons on a Cianbro jobsite must wear safety glasses with rigid side shields 100% of the time with the exception of office environments. Always check for fit when getting a new pair of safety glasses. Ensure that there are minimal gaps between the face and the glasses. Obtain a different model if necessary.

- All activities involving work where conditions exist with airborne particles flying around (i.e. wood yards, windy conditions (see definition), enclosed spaces, etc.) shall require the use of goggles.

7.1.2 Double eye protection is required when operating any power tool including but not limited to electric, air (pneumatic), hydraulic, battery, gas or powder actuated.

7.1.3 When operating power tools in high risk activities, tight fitting goggles or tight fitting safety glasses instead of regular safety glasses are required with a full coverage face shield including a clear chin cup. High risk activities are any activity in which the airborne particles can't be controlled. They include working overhead, working in enclosed spaces, use of blowpipes, activities with windblown particles, or where ricochet of particulates are present.

- In high hazard situations such as demolition activities, a full face respirator (Cartridge style, PAPR, or Supplied air) is highly recommended as it protects extremely well against the eye hazard and also protects against breathing in airborne hazardous materials.

7.1.4 Use of Mesh Face shields

- Mesh face shields meeting the definition included in this document are allowed as part of double eye protection in the following circumstances:
 - Activities such as drilling or sawing that create only wood particulate
 - Pouring and vibrating concrete
 - Refer to the requirements in Section 7.6.4 of this document if necessary to use mesh face shields in other situations.

7.1.5 Other Requirements:

- Use engineering controls to eliminate airborne particulate wherever possible (welding screens, shrouded tools, etc.)
- A full coverage welding hood kept in the down position is considered equivalent to a full coverage face shield.
- The only approved face shields for use on a Cianbro site are full coverage face shields as defined in section 4.
- Work inside confined spaces such as boilers requires a higher level of eye protection. A full face respirator is required. A JHA (Job Hazard Analysis) may be done to justify alternative eye protection but must be approved at the Manager of Projects level or higher.

- Full face tight fitting respirators meet the requirement of double eye protection. Glasses or goggles are not required to be worn underneath the respirator, but they are allowed if they do not interfere with the seal between the respirator and the skin. Full face loose fitting respirators are also considered double eye protection if the faceplate protects against impact when necessary.
- Other workers and helpers in the same work areas who face the same hazards require double eye protection also. Assume all workers nearby need double eye protection. Use the activity plan to identify specifically when they don't.

7.2 Activity Planning (Hazard Identification/Elimination)

- 7.2.1 Using the Activity Planning process, we must identify all possible hazards to the eyes and communicate the hazards to all affected team members. Under many conditions, including other than the mandatory situations listed above, safety glasses are inadequate and goggles and/or shields or other equipment would be required if the hazardous conditions cannot be eliminated or controlled. Remember that elimination of the hazard is the first choice, not PPE. PPE is always to be used in addition to engineering and administrative controls.

7.3 Examples of Hazards and Solutions

- 7.3.1 Wind Blown Particles – Use goggles or tight fitting glasses as they provide superior protection.
- 7.3.2 Congested Work Areas – Set up welding screens, plywood, mill felt, etc., to shield co-workers from flying debris or flashes produced by drilling, grinding, sawing, welding, etc. Goggles or tight fitting safety glasses are required if double eye protection is required.
- 7.3.3 Cleaning Welds – Whether brushing or chipping weld slag – Welders must wear safety glasses or goggles under their hoods and use flip-up lenses, self-darkening lenses (keeping the hood in the down position) or a full coverage face shield.
- 7.3.4 Dust – Use environmental controls such as ventilation, vacuuming or water spray to eliminate hazards.
- 7.3.5 Overhead Work – When looking upwards, the eyes are easy targets for loose paint chips, rust flakes, sand and general debris. Use goggles or tight fitting glasses.
- 7.3.6 Burning – Use a shade #3 or shade #5 face shield as appropriate with safety glasses or goggles.

There are an unlimited number of hazardous conditions not listed here. Please use forethought/planning, available equipment, innovative ideas and caution to eliminate or control the hazard and ensure personal safety. Don't wait to be told to put on additional protection – your sight may depend on your thinking ahead and taking action on your own.

7.4 Cleaning and Anti-fog Considerations

- 7.4.1 Projects shall use Bausch and Lomb #8577 Fog Shield Kit Dispensing Stations or equivalent for cleaning glasses and goggles on site. These provide anti-fog protection each time you clean your glasses and are safe for permanent anti-fog coatings on eyewear.
- 7.4.2 Sea Drops (“diver’s spit”) may also be used for anti-fog protection.
- 7.4.3 Do not use ammonia, alkaline cleaners, abrasive cleaning compounds, solvents, or any “window type” cleaning solutions that could cause degradation to the protective coating on the lens.

7.5 Donning or Doffing (Removing) Eye and Face Protection

- 7.5.1 Particles can build up on top of eye protection (glasses, goggles, face shields, welding hoods, or full face respirators).
- A. Donning glasses, goggles, welding hoods, face shields, or respirators.
- Make sure to clean off all loose materials before placing on your head.
 - Tap your hard hat, welding hood or goggles on something to help remove loose particles before placing on your head or eyes.
 - Lean forward as you place it on your head.
- B. Doffing (Removing) glasses or goggles
- Make sure you are in an area where it is safe to remove the particular piece of personal protective equipment.
 - Vacuum off first if available.
 - Have another team member check for particles and remove if possible.
 - Check for and brush off particles yourself.
 - Make sure to lean forward when removing eye protection so that if anything does fall down it does not get into your eyes.

7.6 Eye Wear Selection Considerations

- 7.6.1 In selecting eyewear consider the following:
- UV protection
 - Side vision
 - Tight/comfortable fit
 - Scratch resistance
 - Anti-Fog resistance
 - Impact resistance
- 7.6.2 Cianbro has identified a “Preferred Safety Equipment” list indicating suggested make and model of protective equipment. The main considerations in selecting this equipment from the many different types offered are quality, comfort, utility, protection and price. Examples of preferred eye protection equipment offered is as follows:
- Shaded face shields (burning & cutting)
 - Glasses and goggles
 - Regular face shields
 - Welding hoods
- 7.6.3 Team members must use rigid side shields on safety glasses. The universal flexible side shields are not allowed on Cianbro projects and client facilities. Replacement side shields are made available at each project.
- 7.6.4 Deviation from the policy: In any special circumstance, the project management must provide the best available protection to ensure personal safety. In situations where following the requirements of this policy create a greater hazard, the following actions must occur in order to deviate from the policy:
- Approval by the top Cianbro manager on site
 - A written site policy or activity plan must be developed that includes the reason for the deviation and what additional actions will be taken to protect the eyes and face of our team members
 - Communication of the deviation and specifically when it applies to all affected team members.
 - Once the deviation has been approved, a copy of the site specific policy or activity plan must be sent to the Corporate Safety email address (corpsafety@cianbro.com) in order to keep track.

7.7 Prescription Eyewear Program

- 7.7.1 For team members with prescription lenses, Cianbro sponsors a prescription eyewear program at each jobsite administered through the Field Administrator or Safety

Specialist. All other team members will be issued standard safety glasses at their jobsite.

7.8 Summary

7.8.1 Remember, our goal zero eye injuries can be achieved if we:

- **Plan** the Activity
- **Communicate** the Plan
- **Eliminate** Hazards
- **Select** the Appropriate Protective Eyewear Equipment for the Task and Conditions

7.9 Safety at Home

Remember to use safe practices and eye protection at home whenever there is a risk of injury to your eyes. Encourage your family members and friends to do the same.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 Documents available on Cianbro.net/Resources/Manuals/Safety Resources/Poster

Procedure for Doffing and Donning Eye, Head and Face Protection Poster
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Policy Number: 022

Authorized By: Michael W. Bennett

Title: Use of Crane Suspended Personnel Baskets

Effective Date: 04/18/94

Page 1 of 4

1 Status

- 1.1 Update of existing policy, effective 03/05/15.

2 Purpose

- 2.1 Use of a crane suspended personnel basket shall be of the last resort.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Anti-Two Block Device:** A positive acting device which prevents contact between the load ball/block and the crane boom tip.
- 4.2 **Controlled Load Lowering Device:** A means of slowly lowering the personnel basket other than the operator stepping on the load line brake (ie: load line going through a gearing system - a Vicon).
- 4.3 **Crane Suspended Personnel Basket:** Any personnel basket used to lift personnel with a crane or derrick.
- 4.4 **Proof Test:** A lift made at 125% of the crane basket's rated load to ensure identification of any deficiencies in the rigging or the basket. Required once when basket is brought on site.
- 4.5 **Rated Load Capacity:** The engineered safe load carrying limit of a structure measured in pounds.
- 4.6 **Trial Lift:** A lift made immediately prior to lifting of personnel with the unoccupied personnel platform loaded at least to the anticipated lift weight from ground level, or any other location where team members will enter the platform to each location at which the personnel platform is to be hoisted and positioned. Must be repeated any time the crane is repositioned.

5 Policy

- 5.1 When the use of a crane suspended personnel basket is the safest alternative, its use shall meet 1926.550(g) (1-8) and the requirements of this policy. Use requires approval of the Safety Director or designee.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of a crane suspended personnel basket under this policy
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 Corporate Safety is responsible for maintaining this document.

7 Use of Crane Suspended Personnel Baskets Index

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9.1	Appendix A Crane Suspended Personnel Basket	4

- 7.1 The use of a crane to hoist team member on a personnel platform (suspended personnel basket) is prohibited, except when conventional means such as a ladder, stairway, aerial lift, elevating work platform, or scaffold would be more hazardous or impossible because of structural design or worksite conditions.
- 7.2 Provided all options have been researched and there is no other feasible means to perform the work, the following Cianbro procedure must be followed:
- 7.2.1 Hoisting personnel shall be of last resort.**
- 7.2.2 Prior to hoisting personnel, a written plan of the activity must be developed by the Project Management and sent to the Corporate Safety Officer or the designee for approval. This should be done by a scan/e-mail or presented in person to ensure timely review. If a fax or the regular mail method is used, it should be followed up with a phone call. Note: Cianbro Equipment will not release a crane basket to the jobsite until a complete written plan is developed by the site team and it is approved by the Cianbro HSSE manager.
- 7.2.3 Only a Cianbro certified personnel basket shall be used to hoist personnel.**
- The total weight of the loaded personnel basket and related rigging shall not exceed 50% of the rated capacity for the radius and configuration of the crane.
- 7.2.4 Proof test - At each job site, prior to hoisting team members on the personnel platform, and after any repair or modification, the platform and rigging shall be proof tested to 125 percent of the platform's rated capacity by holding it in a suspended position for 5 minutes with the test load evenly distributed on the platform (this may be done concurrently with the trial lift). After proof testing, a competent person shall inspect the platform and rigging. Any deficiencies found shall be corrected and another proof test shall be conducted. Personnel hoisting shall not be conducted until the proof testing requirements are satisfied.
- 7.2.5 Trial Lift - A trial lift with the unoccupied personnel basket loaded to at least the anticipated Lift-weight shall be made from the level at which team members will enter the basket, to each location where the basket is to be hoisted and positioned. This trial lift shall be performed immediately prior to placing personnel in the basket and documented. A trial lift shall be repeated prior to hoisting team members whenever the crane is moved and set up in a new location or returned to a previously used location.
- 7.2.6 The crane used to lift personnel must have another system of controlling load lowering, other than the load line hoist brake.
- 7.2.7 The crane must be equipped with a positive acting device which prevents contact between the load ball/block and the boom tip (anti-two-blocking device). The device must deactivate the hoisting system.
- 7.2.8 A radio communications system for uninterrupted voice contact between the crane operator and a person in the personnel basket is required.
- 7.2.9 A competent spotter person, with constant visual contact of the personnel basket, will be in a position to ensure good communication with the crane operator.
- 7.2.10 While personnel are suspended in the basket, no other lifts are to be made using the same crane.

- 7.2.11 Wire rope bridle (4-leg) shall be used to connect the personnel platform to the load line. Each bridle leg shall be connected to a master link or shackled in such a manner to ensure that the load is evenly divided among the bridle legs. The master link shall be connected to the hook on the main load line. All rigging shall be provided with Cianbro designed personnel baskets when shipped from Cianbro stores to the project to ensure all rigging components meet OSHA standards, listed in sub part "N" of 29CFR, 1926. Refer to 9.1 Appendix A.
- 1– Four-legged bridle, 1/2" cables, 8' length
 - 4 – 1/2" Shackles (GS2130)
- 7.2.12 A meeting attended by the crane operator, spotter, team members to be lifted and the supervisor shall be held and documented prior to the lift. The lift activity plan should be reviewed and any last minute concerns addressed. A copy of this plan shall be sent immediately to the Safety Director.
- 7.2.13 The requirements specified in CFR 29 1926.550 (G), shall be reviewed by the supervisor responsible for the activity, prior to making the lift.
- 7.2.14 No variances to this procedure or OSHA requirements can be made except in an emergency life threatening rescue situation.
- 7.2.15 Please remember, hoisting personnel in a personnel basket must be the last resort!

8 Budget / Approval Process

- 8.1 Purchase and maintenance of the personnel baskets are the responsibility of Cianbro Equipment LLC.
- 8.2 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 Safety Policy Number: 028 Crane Safety
- 9.2 Safety Policy Number: 008 Safe Rigging Operations
- 9.3 Documents available on www.cianbro.net>Standard Operating Procedures – on the SOP.

Personnel Platform Lift Planning and Authorization Form	SD1040
Personnel Lift Platform Pre-Lift Inspection	SD1041



Policy Number: 023**Authorized By:** Michael W. Bennett**Title:** Incident Investigation**Effective Date:** 02/01/93Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 03/06/14.

2 Purpose

- 2.1 To ensure consistency in the incident investigation process and knowledge resulting from the investigations is shared throughout the company to eliminate repeat incidents.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Best Practice:** Is an instance when an event (i.e. work practice, policy, procedure or experience), were successful this is the opportunity for projects or team members to share the information throughout the company so others can learn from the experience.
- 4.2 **Lesson Learned:** Is a great tool for sharing information about overcoming obstacles, addressing why the situation occurred and preventative measures for the future. A Lesson Learned is a positive experience, situation in which we learn a valuable lesson and share throughout the company.
- 4.3 **Near Miss:** Is an unplanned event or work practice that did not result in injury, illness, or serious damage - but had the potential to do so. Only a fortunate break in the chain of events prevented an injury, fatality or massive damage. Although human error is commonly an initiating event, a faulty process or system invariably permits or compounds the harm and should be the focus of improvement.
- 4.4 **Root Cause:** The root causes is the basic, underlying cause that allowed the incident to occur. If the root cause is identified and eliminated, this type of incident should not occur again.

5 Policy

- 5.1 All safety incidents will be investigated to determine root causes and effective solutions identified. The incident reports must be sent to corpsafety@cianbro.com to be published as a Lesson Learned.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for deviation from this policy.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project and to ensure a thorough investigation is performed for each incident.
- 6.3 Corporate Safety is responsible for maintaining this document.

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- 7.1 Forms can be found on Cianbro.net in the SOP. Type the name of the report into the search box on the top of the page.

Required Forms:	First Report	Loss Report	Lessons Learned	Spill Report
Incident Table				
Cianbro Recordables/Lost Times	X	X	X	
Injuries	X	X	X	
Subcontractor Incident Lost Times*		X	X	
Serious Third Party Injuries		X	X	
Near Misses			X	
Environmental Contamination			X	X
Property Damage		X	X	

*Subcontractor loss forms are acceptable if within Cianbro criteria. If the subcontractor does not have a loss form Cianbro will allow them to use one.

7.2 Incident Investigation

7.2.1 The incident investigation team will be led by the project manager or designee and will include at a minimum: the leader, the supervisor, and a safety specialist or alternate. The team leader will ensure necessary investigation materials are available including at a minimum, cameras and marking materials such as flags. As we are a construction company, tape measures and tools are always available as needed.

7.2.2 Training: Each team will include at least one member who has had basic investigation, interviewing, and root cause training.

7.2.3 Initial Response:

- Follow the site injury emergency response plan to ensure safety of personnel
- Secure the site, with barricade tape if possible, to ensure others safety and to maintain evidence.
 1. Evaluate the integrity of structures for safety.
 2. Evaluate the presence of hazardous materials using onsite safety specialists and engineers.
- Pictures and or video must be taken to provide an initial record of evidence.
- Record and document all pertinent information
 1. Temperature, wind, precipitation, visibility, or other environmental conditions.
 2. Measurements and dimensions
 3. Locations of personnel/witnesses
 4. Time of day

7.2.4 Special emphasis should be placed on the written description of the incident. Some or all of the following techniques should be utilized for an accurate account of the incident:

- Collect all pertinent document information such as activity plans and work permits.
- Never throw away your field notes. They may be needed at a later date for backup.

- Make sketches of the scene.
- Gather any evidence related to the incident such as tools, PPE, and materials.

7.2.5 Get statements from involved team members or witnesses. Although the statements may be written, recording statements especially for a very serious incident is important. When recording statements:

- Develop an understanding with the witness of what you are there for.
- Ask if they would be comfortable having their statement tape-recorded.
- Explain that tape recording allows detailed information to appear on record and written statements may not.

If they do not want to record, ask them to give you a written statement.

7.2.6 Preparation of the written incident report

All reports must answer the following questions and be written on form SD1042

Lessons Learned.

- What Happened?
- Why Did It Happen (contributing factors)?
- Root Cause?
- What are we going to do to prevent this from happening again?
 1. Identify the corrective actions resulting from the investigation and include who, what, and when.
- How will we do this?
- How will this be communicated?

7.2.7 Identify the root cause

- What is the one thing that had it been different would have prevented the event from taking place.
- Perform a root cause analysis of the injury/incident using a technique such as asking "why" repeatedly until you reach an endpoint.
- Consider the impact of the safety culture on the site when doing the root cause analysis.

7.3 Employer's First Report of Incident (FROI)

7.3.1 Cianbro's "Employer's First Report of Incident" (FROI) is the primary document used for our Injury Management Program and compliance with regulatory reporting requirements. It is essential that this report be generated for all team member incidents, and injuries, no matter how minor or severe. Whether an illness or injury is work-related or not, a FROI should be completed to ensure the injury is managed and any work modifications are identified.

7.3.2 Each report must be completed and forwarded to the Disability Management Department in Pittsfield WITHIN 24 HOURS of the injury/illness date and the incident needs to be reported to a Cianbro representative. In some cases, there may not be enough information available to complete the report in detail before it is sent to the Disability Management Department. In such cases, please forward a copy of what you have with an attached note "More information to follow". Once all information is obtained; forward the original FROI as soon as possible.

7.3.3 *All information requested on the current form is mandatory. Please read the directions carefully, much of the form is self-explanatory.*

7.4 Reporting Requirements

7.4.1 Follow each site specific injury emergency plan for reporting requirements.

7.4.2 OSHA must be notified under the following circumstances:

- All work-related fatalities.
 - Must be reported within 8 hours.
 - Only need to report fatalities that occurred within 30 days of the incident.

- All work-related inpatient hospitalizations , all amputations, and all losses of an eye
 - Must report within 24 hours.
 - Only need to report those that occur within 24 hours of the incident.
- 7.4.3 Every incident or near miss must be reported out daily to all the senior managers of the company via the daily email notification process.
- 7.4.4 Follow section 7.2.6 when reporting of recordable or lost time incidents and section 7.3.2 for reporting of all injury incidents.
- 7.4.5 Report all work related injuries to the client following their site specific requirements or within 24 hours.

Following a recordable injury investigation, the project/site leader will contact the President's office within 24 hours to set up a conference call. Prior to the call, forward the investigation results to corpsafety@cianbro.com. It must include the lessons learned, pictures, activity plan, sketches, and any other pertinent documentation. Failure to comply with the above could result in disciplinary action.

The purpose of the call is to review the investigation process, results, and path forward with the President & COO of Cianbro Corporation; and/or the Chairman, President & CEO for Cianbro Companies and other members of Senior Management.

If a recordable injury happens over a weekend or a team member is transported to a hospital, immediately contact the first person that is reachable in the following order:

- Peter (Andi) Vigue, President & COO of Cianbro Corporation (207) 416-9413
- Earle Cianchette, Sr VP of Operations (207) 415-3560
- Mike Bennett, VP HR, Health, Safety & Environmental (207) 416-8302
- Scott Knowlen, HSSE Manager (207) 416-9579

7.5 Post-Accident Drug Testing

The United States Department of Transportation (DOT), The United States Coast Guard, The Research and Special Programs Administration of Pipeline Safety, as well as certain clients, mandate that we perform Post-Accident Drug Testing under certain circumstances.

- 7.5.1 The U.S. Department of Transportation mandates Post-Accident Drug Testing for Commercial Drivers under the following circumstances:
- Any time the accident results in a Fatality
 - The driver (regardless of fault) receives a moving vehicle citation within 32 hours of the accident and any person involved in the accident receives immediate medical treatment away from the scene of the accident.
 - The driver (regardless of fault) receives a moving vehicle citation within 32 hours of the accident and any vehicle in the accident incurs disabling damage" requiring the vehicle to be towed from the scene.
 - Please note: The criteria above also applies to the U.S. DOT mandated Post-Accident Alcohol testing. The only difference is that a citation must be received within 8 hours of the accident instead of 32 hours.
- 7.5.2 The United States Coast Guard mandates Post-Accident Drug Testing and Alcohol Testing after serious marine incidents. A serious marine incident is a marine incident that results in:
- One or more fatalities
 - Injury needing professional medical treatment beyond first aid and in the case of a person employed on board a vessel in commercial service, which renders the individual unfit to perform routine duties
 - Damage in excess of \$100,000
 - Actual or constructive total loss of any inspected vessel
 - Actual or constructive total loss of any self-propelled uninspected vessel of 100 gross tons or more
 - 10,000+ gallon oil spill

- Release of Hazardous Material greater than or equal to its reportable quantity whether from a casualty or not

7.5.3 The Research and Special Programs Administration Office of Pipeline Safety govern the substance abuse and alcohol testing of covered pipeline workers. Post-Accident Drug/Alcohol Testing is mandated when the Team Members actions contributed to an event involving a release of gas from a pipeline or LNG facility that results in:

- A death, or personal injury necessitating inpatient hospitalization.
- Estimated property damage, (including gas lost to the operator or others, or both) that exceeds \$50,000.
- Unintentional estimated gas loss of three million cubic feet or more;
- An event that results in the shutdown of a LNG facility.
- An event that is significant, in the judgment of the operator, even though it did not meet the above criteria.

Some of Cianbro's clients require Post-Accident Drug testing as part of our contract to perform work for them. Please inform Cianbro Human Resources of client mandated drug testing circumstances at any of your jobsites. For further information on Post-Accident Drug Testing please consult Cianbro Human Resources.

7.6 Loss Report

Cianbro's "Loss Report" Form is designed to capture information pertaining to incidents involving motor vehicle damage, property damage, theft, vandalism, and possible loss recovery within the organization. It is used as an aid in gathering information for reporting a variety of liabilities to our insurers. This form covers Cianbro owned, leased, and rented equipment, property of others (subcontractors and public) and alleged bodily harm or injury occurring to a non-Cianbro employee. Please completely fill out the form with its appropriate sections and send to Cianbro Equipment Administration immediately, as the lag in time of claims being reported to the insurers are tracked and often times negatively affects the management and/or duration of the claim.

7.7 Near Miss/Lesson Learned/Best Practices

7.7.1 Cianbro's Near Miss/Lesson Learned Management Process is designed to promote, encourage and recognize the reporting and communication of Near Miss/Lesson Learned occurrences. The resulting information can then be used to prevent future occurrences and incidents.

If we don't report and learn from near misses, we will likely have a more serious result in the future. Or, alternatively, the more problems or issues we can identify and correct, the better the chance we have of mitigating or completely eliminating the more serious incidents.

7.7.2 All Near Miss occurrences will be investigated by the on-site team to determine the root cause.

Any time you think to yourself, "It is a good thing that..." or "We were lucky...", then you have a Near Miss that must be investigated. Even if there is no event but the potential incident was recognized and an action taken to prevent the incident, the situation should be investigated. For example, just before a load is lifted it is noticed that the nylon sling runs over a corner that is potentially sharp enough to possibly cut the sling under tension. Clearly, this is a Near Miss that we need to report and learn from.

A thorough Near Miss investigation allows us to learn from an incident without harm to team members, equipment or the environment. Your investigation may prevent another Cianbro team member from getting hurt!

7.7.3 All lessons learned will be posted on Cianbro.net for all sites to review and use in their planning.

7.8 Spill Procedure Summary

Petroleum Spills:

- Remain calm. If there is danger of fire, call the local fire department.

- Stop the source of the spill, if possible, by valving, plugging, caulking, or other means available. Secure area with barrier tape.
- Take a brief action, which will prevent or delay oil from reaching navigable waters or spreading across the surface of the ground. This may require building a dike with soil, speedy-dri, rags or pads; or digging a trench to divert the flow of oil.
- If directions from numbers 2 and 3 stated above cannot be accomplished **quickly**, notify supervisor immediately for help.
- Call responsible supervisor for your area to inform him/her of the spill incident.
- Complete Oil Spill Report Form and call Corporate Safety Department within 30 minutes of spill.
- If oil has or will reach a water source, deploy oil boom. This should be done for any spill involving a product entering water or possible entering the water.
- Call the State's Department of Environmental Protection.
- For spills involving the product entering the water, call the National Response Center (NRC/Coast Guard) at 1-800-424-8802.
- Complete/Sign & Date/Mail White copy of Spill Report Form to Corporate Safety within 2 days of cleanup. Retain Canary color copy for project files.
- Clean up Area:
 - Wipe all impervious areas with absorbent pads until there is no residue or sheen if water is applied to the area.
 - Remove any stained soil and place into a 55 gallon drum. If amount of soil to be removed exceeds six 55 gallon drums contact an approved clean up contractor such as Clean Harbors for alternate disposal methods. Stained soils can be removed from the spill area and placed on 6 mil poly, covered with 6 mil poly while awaiting an alternate disposal site.
 - Place all rags, pads, booms and protective clothing into a 6 mil poly bag and then into a 55 gallon drum. Keep bags to a 30-pound limit.
 - Label drums appropriately.

Jobsite should use an approved Clean up Contractor, Clean Harbors for spills too large for us to handle.

7.9 Chemical Spills

- Complete the oil spill Report Form.
- Immediately notify the Corporate Safety Department (within 30 minutes). Complete/Sign & Date Mail form to Corporate Safety within 2 days of clean up.
- Guidance on state agency notification will be given by the Corporate Safety Department.
- If product enters water, notify the National Response Center (NRS/Coast Guard) 1-800-424-8802

****Note:** This is only a guide to pertinent aspects of spill response. For details, contact the Corporate Safety Department and or Facility's Spills Prevention Control and Countermeasure Plan (SPCC Plan).

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachment.
- 9.2 Documents available in the SOP on Cianbro.net

Recording a Witness Statement	SD1028
Injury Emergency Action Plan Template	SD837



Recordable

Whenever there is a Recordable Injury (injury requiring medical treatment beyond first aid) the project/site leader will contact the President's office within a 24 hour period to set up a conference call. The conference call will be set up within 72 hours to allow enough time to conduct a thorough investigation.

1. Definition

What happened?

Details of the incident.

Why did it happen?

Perform a root cause analysis of the injury/incident. If the root cause is deemed "team member's personal choice", then an explanation of how you create a safety culture at your site is necessary.

What are we going to do to prevent this from happening again?

Outline steps and measures to avoid future incidents.

How will this incident be communicated?

Describe steps that you take to ensure that the information will be provided to all sites.

2. Purpose

The purpose of the call, to provide the following information, as well as a communication plan from the site leader directly to Peter (Andi) Vigue, President & COO of Cianbro Corporation; or Peter G. Vigue, Chairman, President & CEO for Cianbro Companies and/or other members of Senior Management.

Forward the above information prior to your conference to Donna Jacques either by fax at (207) 679-2463, or by email to djacques@cianbro.com.

Failure to comply with the above will result in disciplinary action.

If a recordable injury happens over a weekend contact Peter (Andi) Vigue, President & COO of Cianbro Corporation; or Peter G. Vigue, Chairman, President & CEO for Cianbro Companies and/or other members of Senior Management, on Monday morning unless the team member was transported to a hospital. Immediately contact one of the following in the order listed; Mike Bennett (207) 416-8302, Earle Cianchette (207) 415-3560, Andi Vigue (207) 416-9413, Peter Vigue (207) 416-9412, or Alan Burton (207) 416-9686 or (207) 873-7667.

A handwritten signature in black ink that reads "Peter G. Vigue". The signature is written in a cursive style and is positioned above a horizontal line.

Peter G. Vigue, Chairman, President & CEO

Policy Number: 024**Authorized By:** Michael W. Bennett**Title:** Equipment Certification Program**Effective Date:** 09/05/05Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To ensure safe and efficient operation of each piece of equipment along with good preventive maintenance for each unit.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Authorized Operator: A team member who is certified by Cianbro to operate a specific type/piece of equipment.
- 4.2 Competent Operator: A team member who has taken the operator safety training and has a proficiency rank of a 1 or 2.
- 4.3 Novice Operator: A team member who has taken the operator safety training and has a proficiency rank of a 3 or 4, only operate under the supervision of a competent operator. The team member and the competent operator must be in the activity plan and have job supervisor approval.

5 Policy

- 5.1 All equipment operators will follow manufacturer's recommendations regarding limitations, maintenance, inspection, setup and operation as well as Cianbro's specifications and regulations for the equipment. No equipment will be used in a manner in which it was not intended or designed for without written permission of the manufacturer.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Training

Training for each piece of equipment will include safe and efficient operation and basic preventive maintenance.

7.1.1 On The Job Training (OJT)

Novice operators are encouraged to practice operating equipment, but only under the close supervision of a qualified and competent operator to gain experience. Mentor and trainee both need to be identified in the Daily Activity Plan. In addition, both need to be approved by job management. The supervisor shall only permit certified competent team member's who are qualified by training and experience to operate equipment in the work environment (with the exception of training situations, in which case the trainee is under close supervision of a Cianbro certified competent operator). Supervisors shall have confidence of the operator's ability in performing the task assigned.

Note: seat belt required 100% of the time on all equipment

7.1.2 Equipment Safety Training:

Equipment safety training is available from a qualified regional trainer. Operator trainees will be safety trained on the following equipment:

- <90' Aerial Lift, Scissor Lift, and >90' Aerial Lift
Approximately two hours of classroom instruction with bookwork, written tests, video, interaction between instructor and class, questions and answers, and hands on practical application with lifts approximately 15 min. for each individual.
- DFM Bridgemaster & Paxton-Mitchell Snooper
Familiarization period with equipment, quiz and practical application.
- Excavator, Loader/Hoe/Dozer, Loader with Attachment, Articulated Dump Truck (covers equipment such as Carrier on track, Dump on track) and Skid Steer
An hour and a half of bookwork, test, video, classroom instruction, questions and answers. Practical application with topics specific to each piece of equipment runs about 15 min. for each individual.
- Fork Truck
Two hours of bookwork, quizzes, video, questions and answers, class interaction, overheads, topics specific to each piece of equipment, and practical application 15 min. for each individual.
- Reach Truck
Two hours of bookwork, quizzes, video, questions and answers, class interaction, overheads, topics specific to each piece of equipment, and practical application 15 min. for each individual.
- Truck Crane, Crawler Crane, Boom Truck, Carry Deck, and RT Hydraulic Crane
Novice operators enrolled in the crane operator training program are encouraged to operate equipment, but only under the close supervision of a qualified and competent operator. Mentor and trainee both need to be identified in the Daily Activity Plan. In addition, both need to be approved by the crane operator training coordinator in the Pittsfield Equipment Group. See Procedure for Assignment of Cable Lift Equipment Operators, located under the equipment section of PAM.
- Bucket Truck, Flex Track Bucket, Digger/Derrick Truck, Flex Track Digger/Derrick.

Two hours of bookwork, video, quizzes and Q and A, class interaction topics specific to each individual piece of equipment. 15-20 minute hands on familiarization time for each team member. Digger/Derrick operator should also have a NCCCO certification for swing cab hydraulic crane.

- Dinnie Push Boats
Reference the Marine Safety Policy and Procedure.
- All Other Small Boats
Reference the Marine Safety Policy and Procedure.

7.2 Cianbro Operator Certification Program

It is management’s responsibility to identify equipment operators for training. Management should request training for identified team members using the Equipment Training Request Form. All operators passing the appropriate equipment safety training class(es) will be deemed “Safety Trained” on their respective piece of equipment. A hard hat decal will be passed to the team member upon completion of the safety training by the trainer. The sticker that the team member will receive is going to be red for proficiency level 3 or 4. The red outlined sticker signifies that the team member is not ready to operate the piece of equipment alone. Most new trainee will be ranked “learning” and will require close supervision to operate. As the team member gains more experience, the supervisor will update the proficiency level. Once the team member reaches a proficiency level of 1 or 2, and then they will be issued a blue outlined hard hat sticker signifying that they are proficient alone.

7.2.1 Team Member Profile (TMP)

- Yearly, the team member and supervisor will evaluate and update, if need be, the proficiency level for each equipment Certification the team member posses.
- By performing our yearly update/review of team members’ proficiency level while conducting our team member profile (Cianbro performance management tool) we will not only meet but exceed OSHA’s requirement that stipulates powered industrial truck (fork truck) operators shall be evaluated at least once every three years. This evaluation must be performed by a Competent Qualified Operator.
- If the supervisor feels that the operator needs retraining on a specific aspect of operation or needs a total safety retraining, the certification should be immediately suspended and based on our needs the operator could be retrained by a Qualified Competent Person. Retraining will be documented in the training record of the team member and his proficiency updated accordingly.

EXAMPLE

<i>Cianbro Certification</i>						
Equip Certification	Date	Current Proficiency	Trainer	Proficiency Level represents the TM adequately?		
Aerial Boom <90'	11/11/2003	2 Proficient Alone	Brad Vanadestine	Yes	No, please update	
Aerial Boom >90'	11/11/2003	2 Proficient Alone	Brad Vanadestine	Yes	No, please update	
Fork Truck	01/15/2003	2 Proficient Alone	Henry P. Gamez	Yes	No, please update	
Loader with Attach	06/17/2004	2 Proficient Alone	Alan R. Goepner	Yes	No, please update	
Reach Truck	10/27/2004	2 Proficient Alone	Alan R. Goepner	Yes	No, please update	
Scissor Lift	11/11/2003	2 Proficient Alone	Brad Vanadestine	Yes	No, please update	
Proficiency Rank:	1: Expert	2: Proficiency Alone	3: Proficiency w/Others	4: Learning	O: Unknown/To be Determined	

7.3 Operation

- 7.3.1 Team members operating equipment are required to perform a pre-shift/pre-use inspection of any piece of equipment they are assigned to use. The inspection must cover all manufacturer required items as well as items included on the Operator's Safety Inspection Card.
- Keep the appropriate documentation:
- Operator's Safety Inspection Card (Form #SH925)
 - Monthly Hoisting (where applicable) (Form #OP410)
 - Annual Hoisting (where applicable) (Form #OP410)
- These are to be completed and kept in order by the team member operating the equipment.
- 7.3.2 The supervisor shall only permit certified qualified team members (authorized operators) who are qualified by training and experience to operate equipment in the work environment (with the exception of training situations, in which case the trainee is under close supervision of a Cianbro certified competent operator). Supervisors shall have confidence of the operator's ability in performing the task assigned.
- 7.3.3 Passengers are not allowed in or on mobile equipment unless the piece of equipment is designed to accommodate passengers safely.
- 7.3.4 All passengers and operators must fasten and adjust their seat belts prior to starting the engine if the piece of equipment is designed to have them.
- 7.3.5 All mobile equipment shall have a working back-up alarm. In the case of a piece of equipment that must be backed up on a job site without a back-up alarm (for example an over the road tractor trailer delivering materials to the job site) a spotter or spotters must be used. In addition, spotter may be needed even if the equipment has a working back-up alarm. Refer to Section 7.7 of this document.
- 7.3.6 In enclosed cabs, hard hats and eye protection are not required. If the cab is operated with the doors or windows open then eye protection is required. If the cab does not have overhead protection then a hard hat is also required.
- 7.3.7 All mobile equipment shall only be used within the load limits established by the manufacturer. The operator is responsible for knowing those limits and the weight of the load they are planning to move.
- 7.3.8 The operator of the equipment must verify that trailer chocks, supports, and dock plates are in place prior to loading/unloading material.
- 7.3.9 All loads shall be adequately secured prior to moving the load. It is the responsibility of the operator to ensure the load is adequately secured based on size and weight of load and on the conditions of transport.
- 7.3.10 Fueling Procedures
- The engine must be shut off
 - No open flames, hot work, or smoking is allowed in the immediate area
 - The person filling the tank shall make sure the nozzle is in contact with the filling neck of the tank to prevent static sparks.
 - Off-road diesel shall not be used in vehicles that can go over the road.
 - No team members are to be on or in the equipment while fueling unless the design requires it.
 - Ensure adequate spill response material is available in the area
 - Avoid fueling equipment in any area where a spill would reach sewers, drains, or navigable waterways.

- The person fueling the equipment is required to stay with the equipment until the operation is complete.

7.4 Qualification

- 7.4.1 Trainer assumes proficiency to be learning (proficiency rank 4) and will be entered into the system as learning. Supervisor should fill out the Equipment Training Request Form for the team members to receive training. Supervisor must sign the Proficiency Rank Update Form before team member receives blue outlined hard hat stickers (proficiency ranks 1 and 2). Supervisor should establish proficiency at this time.
- 7.4.2 Operator's qualification(s) can be verified at www.cianbro.net under the Human Resources section/ Special Download/Qualification Master or the People Matrix.
- 7.4.3 Supervisors are responsible to ensure that the team member has the operating skill proficiency for the task assigned. They need also to ask the team member to come forward if they don't feel confident with the task assigned.
- 7.4.4 Proficiency should be monitored on an on-going basis and updated formally at least once a year on the Team Member Profile.
- 7.4.5 OSHA states that, "Fork truck operators need to be re-certified every three years". We want to confirm every operator's proficiency at least once a year. Team members need to be evaluated by a certified fork truck operator or by a supervisor who is certified.

7.5 Team Member Profile (TMP)

- 7.5.1 Supervisors are required to update or confirm with their team members the proficiency rank for each equipment certification.
- 7.5.2 At anytime, a supervisor can request a blank TMP to perform reviews more frequently than once a year.
- 7.5.3 A blank Team Member Profile can be obtained by contacting your regional HR department.

7.6 Random Substance Abuse Testing For Operators

- 7.6.1 All Cianbro certified operators are placed in a pool for the purpose of being selected for random drug testing.
- 7.6.2 Operators will be notified by the project site when they have been selected and will be instructed to go to a designated site to give a specimen.
- 7.6.3 Operators who engage in conduct that clearly obstructs testing or who fails to provide adequate urine for substance abuse testing without a valid medical explanation will be considered to have refused to submit to a substance abuse test. Operators who refuse to submit to a substance abuse test required in accordance with Cianbro's Substance Abuse Program will be terminated immediately.
- 7.6.4 Operators who receive a confirmed positive substance abuse test result will be offered the services of Cianbro's EAP for counseling and/or rehabilitation at Cianbro's expense. Cianbro will provide team members with an opportunity to participate for up to six months in a rehabilitation program designed to enable them to avoid future use of a substance of abuse. If team members choose not to participate in a rehabilitation program or do not comply with the rehabilitation, they will be terminated immediately. Team members will be removed from operating all equipment for a period of at least 30 days or until deemed able by EAP, whichever is greater.

7.6.5 For more information, see Cianbro's Substance Abuse Program pamphlet.

7.7 Use of Spotters Around Equipment

7.7.1 Spotters for Moving Equipment

Whenever you have congested situations on a site, you must address methods to protect people and equipment. Eliminate the hazard whenever possible through the use of barriers, designated travel ways, relocating work in time or location, or other engineering and administrative controls. These methods can include the use of spotters. In the following situations you must evaluate the use of spotters to move equipment:

- Whenever you have multiple pieces of equipment working in the same general area.
- Whenever you have both foot traffic and equipment in the same general area.

7.7.2 Spotter for the Use of Equipment with Forks to Move Materials

A. Inspection of Forks

- Do a quick visual inspection as part of the required daily inspection.
- During the required monthly lifting equipment inspection (Form #OP410), the inspector must clean the forks and do a thorough visual inspection. If there are any visual indications of possible cracking, then remove the forks from service and contact the Equipment Group to do further testing.

B. Use of Spotters: Whenever we are using forks to move materials, the operator must be able to determine that the forks have not protruded through and hooked onto other materials. This can be accomplished by:

- Using a spotter to help guide your forks to the proper location under the load.
- Act as your own spotter by getting out of the cab to visually inspect whether the forks are properly located.
- In situations where there is nothing else that could be hooked by the forks these methods are not necessary.

7.8 Equipment and Counterweight Safety

7.8.1 Effective August 1, 2009, all of the following equipment series (see table below) will have a clean rear portion and/or counterweights without any scratches in the equipment coating and/or decals. Individual projects are responsible for labor and materials to identify and coat any damage to the rear portion and/or counterweights of their equipment prior to the August 1, 2009 date. For coating specifications and required decals contact Cianbro Equipment, LLC (Howard Lynds 207-679-2276).

Equipment	Series#
Tracked Equipt (T-Line)	021-
ForkLift Trucks and Telehandlers	022-
Rubber Tired Loader and Skid Steers	023-
Arial-Scissor Lift	024-
Tracked Type Dozer	025-
Tracked Type Loader	026-
Truck Crane/Backhoe (Cable)	033-
Crawler Crane/Backhoe (Cable)	035-
Crawler Crane/Backhoe (Hydraulic) inc. Mini Excavator	036-
Hydraulic Crane/Carry Deck	037-

Current Total 273 Pieces of Equipment

7.8.2 The condition of all rental equipment and subcontractor equipment will be documented by the responsible project using pictures, the receiving ticket, and on the appropriate Equipment Inspection Report. Third-party rental equipment shall not be repaired or coated prior to and/or after August 1, 2009 without authorization from owner, which shall be obtained by Cianbro Equipment, LLC only. Projects shall work with subcontractors to ensure that the condition of their equipment is within compliance of this policy.

7.8.3 If an event occurs after August 1, 2009 in which the rear portion and/or counterweight of a piece of Cianbro owned, Third Party rented, and/or Subcontractor equipment is damaged (including but not limited to damage to the coatings), work will stop, a Near Miss/Lesson Learned/Loss Report investigation will take place by the project team, notification of the incident will be communicated to the appropriate Safety/Near Miss manager and Cianbro Equipment, LLC within 24hours of the event and Cianbro's Progressive Disciplinary Process will be enforced. Cianbro Equipment, LLC will be notified prior to any equipment being repaired or coated after an incident. In the event equipment damage is not reported, the supervision will be held accountable under Cianbro's Progressive Disciplinary Process.

7.9 Driver Qualification Requirement in Combination with a Specific Equipment Decal

7.9.1 Equipment that is registered will require the proper Cianbro driver qualification level and driver's license endorsement beyond the equipment certification. Ex: For a bucket on truck the team member will need the Cianbro equipment certification "BUCKET DECAL" and a Driver Level 3 qualification to move the equipment from point to point on a project site or public road

Equipment not registered and operated in an area that is gated, blocked off from the public, or not intended for public access, requires that the operator hold the appropriate Cianbro equipment certification.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 Documents available on Cianbro.net

Equipment Training Request Form
Proficiency Rank Update Form

Policy Number: 025**Authorized By:** Michael W. Bennett**Title:** Bloodborne Pathogens**Effective Date:** 04/18/94Page 1 of 12

1 Status

- 1.1 Update of existing policy, effective 03/05/15.

2 Purpose

- 2.1 The risk of bloodborne disease transmission is higher than ever unless we prepare for it. In the event there is an incident, we need to be prepared to prevent exposures and know what action to take should there be an exposure.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Bloodborne pathogen exposure: Any situation where an individual has contact with someone else's blood directly onto his/her non-intact skin, or into the eyes or mouth.
- 4.2 Decontamination: The use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.
- 4.3 Epidemiology: The study of disease in populations.
- 4.4 Hepatitis B: An inflammation (irritation and swelling) of the liver due to the hepatitis B virus (HBV). The hepatitis B virus spreads through the body and other body fluids.
- 4.5 Non-intact skin: Skin with dermatitis, hangnails, cuts, abrasions, chafing, open or uncovered wounds, etc.
- 4.6 Qualified individual: One who is knowledgeable in the subject matter, in the bloodborne pathogen standard, and can relate both to the workplace that the team members are working in. Project Superintendent or their designated qualified person (i.e. Safety Specialist) shall perform the training.
- 4.7 Universal precautions: An approach to infection control. All human blood and certain human body fluids are treated as if known to be infectious for bloodborne pathogens.

5 Policy

- 5.1 This plan has been provided to eliminate or minimize occupational exposure to bloodborne pathogens in accordance with OSHA standards, thereby protecting our team members.

6 Responsibilities

- 6.1 Corporate Safety is responsible to ensure implementation of this exposure control plan. This plan will be maintained, reviewed, and updated at least annually, and whenever necessary to include new or modified tasks and procedures.
- 6.2 Those team members who are determined to have occupational exposure to blood or other potentially infectious materials must comply with the procedures and work practices outlined in this plan.
- 6.3 Top Project Management will provide and maintain all necessary personal protective equipment (i.e. disposable gloves, eye protection, etc). They will ensure that all equipment is available in appropriate sizes.
- 6.4 Top Project Management will be responsible for ensuring that all medical actions required by the standard are performed and that appropriate team member health and OSHA records are maintained.
- 6.5 Top Project Management will be responsible for training, documentation of training, and making the written exposure control plan available to team members.

7 Bloodborne Pathogens Index

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Please Note: Training manual for presenter and student is located on the intra net under Resources| Manuals| Monthly Safety Training Calendar & Material 4.0 April & 4.1 April.

7.1 Training Requirements

7.1.1 Training shall be performed initially for first responders at jobsite orientations and for team members that could be exposed to blood or other potentially infectious materials then at least annually thereafter. Annually is defined as within 12 months of their previous training.

7.1.2 The training program shall provide an opportunity for interactive questions and answers and the training program must be performed by a qualified individual.

7.1.3 The training program must cover at a minimum the following elements:

- A copy of the Bloodborne Pathogen Standard and an explanation of its contents;
- General explanation of the epidemiology and symptoms of bloodborne diseases;
- Explanation of the modes of transmission of bloodborne pathogens;
- Cianbro's Bloodborne Pathogen Exposure Control Plan/Policies and how a team member can obtain a copy of these items;
- Ways of recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;
- Explanation of the use and limitations of methods that will prevent or reduce exposure;
- Information on the types, proper use, location, removal, handling, decontamination and disposal of PPE and waste;
- Explanation on how to select PPE;
- Information on the Hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and the vaccine and vaccination will be offered free of charge;
- Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials;
- Information on the post-exposure evaluation and follow up;
- Information on completing the Exposure Incident Report Form;
- Explanation on signs and labeling;
- Location of the puncture resistant biohazard container for sharps (needles).

A copy of an adequate training program can be found on cianbro.net power point presentation of this Safety Policy and Procedure.

7.2 Engineering and Work Practice Controls

7.2.1 Engineering and work practice controls shall be used to eliminate or minimize team member exposure.

- 7.2.2 When provision of hand washing facilities are not feasible, appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes shall be provided.
- 7.2.3 Team members shall wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.
- 7.2.4 Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed. Shearing or breaking of needles is prohibited.
- 7.2.5 Immediately or as soon as possible after use, contaminated sharps shall be placed in appropriate containers, which shall be leak-proof, labeled, and puncture resistant.
- 7.2.6 Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a likelihood of occupational exposure.
- 7.2.7 Minimize the presence of broken glass in work areas. Use a small broom and dustpan to pick up broken glass and/or "sharps."
- 7.2.8 Team members are not to touch/clean up any biohazards which would include, but are not limited to, blood, body fluids, sharps (needles) or soiled clothing. They are to contact their safety department or project manager who will conduct a safe clean up as outlined in this policy.
- 7.2.9 Do not use spray bottles that can mist the germicide into the area because people then breathe in the germicide and/or scatter the bloodborne pathogen(s).

7.3 Exposure Determination

- 7.3.1 All team members at a Cianbro jobsite and/or facility may have the potential of having an occupational exposure. Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials. Safety Specialists are probably the personnel with the highest risk of having an occupational exposure since they deal with injury management and first aid functions on a regular basis. Tasks that may pose a potential for an occupational exposure without regard to the use of personal protective equipment are:
 - Personnel required to decon an area;
 - Personnel required to handle waste disposal;
 - Personnel who perform certain janitorial tasks;
 - Personnel who are required to clean up a jobsite where sharps, broken glass, fecal material, etc. have been discarded (i.e., bridge abutment once occupied by homeless people);
 - Personnel who perform first aid and/or CPR.
 - Personnel who try to recap Bee Sting or insulin needles/pens.
DO NOT RECAP.

7.4 Notification Requirements

- 7.4.1 Contact the immediate Supervisor, Project Manager/Superintendent and the Safety Specialist immediately should an exposure incident occur.
- 7.4.2 Supervisor, Project Manager/Superintendent and the Safety Specialist must report the incident to the Corporate Safety Department within 2 hours by telephone of the exposure incident.
- 7.4.3 The Safety Specialist shall immediately complete the Exposure Incident Report Form in Appendix B and Cianbro's First Report of Incident. Fax a copy to the Corporate Safety Department within 24 hours of the incident.

- 7.4.4 The Safety Specialist, unless he/she is the exposed, shall complete the source I.D. and secure the source's agreement (verbal) to be tested for HIV/HBV.
(Note: The source has a right to refuse testing.)

NOTE: Following an exposure incident, prompt medical evaluation and counseling is imperative. Timeliness is an important factor for effective medical treatment. Medical evaluation must occur on the same day as the exposure.

- 7.4.5 If Safety Specialist is exposed; all Safety Specialist responsibilities outlined in this section (Notification Requirements) must be the responsibility of the Project Manager/Superintendent.

- 7.4.6 The Safety Specialist, unless he/she is exposed, shall arrange a post exposure medical evaluation at an approved clinic from Cianbro's Clinic Listing or if there is not one available contact OMC at 1-800-575-6537 for the exposed individual and HIV/HBV testing for the source individual. Notify the Manager of Environmental Hazards or the Safety Department Supervisor immediately.

- 7.4.7 Corporate Safety Department will be responsible for notifying Occupational Medical Consulting (OMC) in Leeds, Maine and EAP at 1-800-769-9819 within 30 minutes of their notification.

7.5 Exposure Incident Report

- 7.5.1 No incident is too small. Any incident involving contact with body fluids will require the Safety Specialist and/or Project Manager/Superintendent to complete the Exposure Incident Report found in Appendix A. Each blank on the form must be properly completed and be as specific as possible when completing it.

- 7.5.2 The report must be completed in strictest of confidence. When completing the report ensure that the exposed individual is interviewed on a one on one basis. DO NOT interview the exposed person in front of others. Also, keep all information confidential. DO NOT discuss the obtained exposure incident report form information with other workers.

- 7.5.3 It is essential that immediate notification and action be taken following an exposure incident. "Time is of the Essence." Any time someone comes in physical contact with the blood of someone else without proper personal protection, it constitutes an exposure incident and must be reported immediately in order for a physician to determine if an exposure has occurred.

7.6 Source Identification and Testing Procedure

- 7.6.1 The Safety Specialist responding to the exposure event shall identify the exposure source individual(s) in the Exposure Incident Report providing the source individual agrees in writing to such identification. The Safety Specialist will obtain written consent for and arrange for follow-up medical evaluation and testing of the source. Voluntary source testing should follow the established Bloodborne Pathogen Post-Exposure Medical Evaluation Protocol.

- 7.6.2 The source must be made aware that the results of the testing for HIV and HBV infectivity will be made available to the exposed team member for use in completing necessary medical evaluation and treatment. The source must be assured that actual test results will not be forwarded to the employer. No source testing is to proceed without the written consent from the source. If the source refused identification and/or evaluation testing, notify the Corporate Safety Department of the situation and proceed with the evaluation of the exposed team member(s).

- 7.6.3 NOTE: If the Safety Specialist is the exposed individual or source individual this responsibility falls on the Project Manager/Superintendent. Confidentiality is crucial in these matters!

7.7 Post Exposure Evaluation and Follow-up

- 7.7.1 Cianbro personnel complete exposure incident report.
- 7.7.2 Cianbro personnel complete source identification and secure source's verbal agreement to be tested.
- 7.7.3 Cianbro personnel arrange post exposure medical evaluation for exposed and HIV/HBV testing for source. Notify the Corporate Safety Department simultaneously.
- 7.7.4 The Corporate Safety Department notifies Occupational Medical Consulting (OMC) immediately.
- 7.7.5 Occupational Medical Consulting a) contacts local provider (assures appropriate form utilization, procedure and results reporting), and b) exposed name to recall. Re-check 30 days to assure completion/record forwarding, etc.
- 7.7.6 The Clinic completes encounter(s) per protocol (interviews, counsels, and tests) and forwards "Post Exposure Medical Evaluation Results Reporting Form" to Occupational Medical Consulting after each visit.
- 7.7.7 Occupational Medical Consulting forwards standard compliant medical opinion to Cianbro.
- 7.7.8 Source individual and exposed individual shall be notified of results by OMC.
- 7.7.9 The clinic will bill OMC at RR 1, PO Box 3380, Leeds, Maine 04263.

7.8 Personal Protective Equipment (PPE)

- 7.8.1 The following equipment must be made available at no cost to team members at each jobsite and must be used when an incident occurs:
 - Disposable (single use) latex or rubber gloves. These items shall be worn when handling contaminated items or supplying aid to an injured person(s). These items must be made part of each first aid kit. A double layer of gloves must be worn if incident is major and there is a lot of blood.
 - Surgeon's mask/goggles/face shields. These items shall be worn if splashes or splatters of potentially infectious materials are expected. These items must be made part of each first aid kit. This item can only be worn when dealing with bloodborne pathogens.
 - Antiseptic towelettes or waterless hand cleaner. If hand washing is not feasible, team members shall use antiseptic towelettes or waterless hand cleaner to clean their hands. However, team members will wash their hands in soap and warm, running water as soon as feasible.
 - Protective Body Clothing. Appropriate protective body clothing shall be worn in occupational exposure situations. The type and characteristics will depend upon the task and degree of exposure anticipated
 - A disposable CPR mask shall be part of the first aid kit.

NOTE: If a resuscitation bag is available it shall only be used by trained, qualified individuals.

- Biohazard labels. These labels shall be use to mark containers and bags containing contaminated items.
- Puncture Resistant Containers. At least one of these containers should be made available at jobsites and at fixed facilities. These containers shall be used for the disposal of glass contaminated material, needles (from use of bee sting kits, diabetes, EPI pens, etc.) and any other sharps.
- Red Biohazard Bags. These items should be on every jobsite and at every fixed facility. These items can become part of the first aid kit(s).

7.8.2 Proper Sequence of Doffing Personal Protective Clothing

- Soiled or stained boot covers will be removed first. Then remove outer gloves, if present.
- Soiled or stained aprons or suits will be removed by rolling apparel into itself. This will keep the contaminants trapped inside and the clean part of the apparel will be on the outside.
- Remove surgical mask.
- Remove inner layer of gloves (or only layer of gloves). Remember to only touch the inside of the second glove. The “rule of thumb” is to only touch Dirty to Dirty and Clean to Clean.
- Dispose of all PPE as biohazard waste.

7.9 Hepatitis B Vaccination

- 7.9.1 The Hepatitis B vaccination consists of a series of three (3) shots. The series must be completed once an individual begins the series. The second shot is received one (1) month after the first shot of the series, and the third shot is received five (5) months after the second shot of the series. Following the 3-dose series more than 90% of the individuals develop Hepatitis B antibodies. However, please note that 10% of the individuals given the series may not develop the antibodies. Immunity lasts for about 5-7 years at which time it may be necessary to have a booster shot to re-establish immunity.
- 7.9.2 Individuals receiving the vaccination have reported no serious adverse reactions. Some common reactions have been swelling and warmth around the injection site, headache, nausea, dizziness, and low grade fever which usually subsides within 48 hours.
- 7.9.3 The series is offered to Cianbro Safety Specialists and non-contracted janitorial personnel at no cost to them provided they complete the series. The series will also be offered to individuals who have suffered an exposure and have received a medical evaluation and counseling at no cost to them.
- 7.9.4 NOTE: If a Safety Specialist or janitorial personnel start the series and do not finish it, the cost will be incurred by the team member.
- 7.9.5 All new Safety Specialists and/or janitorial personnel shall be offered the HBV vaccination within 10 days of starting work at Cianbro Corporation. If team members decline the vaccination, they must sign the Hepatitis B Vaccination Decline Form (Appendix B). It must be made clear to the team member that if they choose to decline, they may later opt to receive the vaccine at no cost to them.
- 7.9.6 If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose shall be made available.
- 7.9.7 The Regional Human Resource Managers must notify the Supervisor of the Corporate Safety Department whenever a person is hired or placed into a safety role/position.

7.10 Decontamination

- 7.10.1 Hand washing with an anti-bacterial soap is required whenever a person comes in contact with body fluids, even if personal protective equipment (i.e., gloves) has been worn. If facilities for hand washing are not and cannot be made available, an appropriate antiseptic hand cleaner in conjunction with clean towels or antiseptic towelettes must be available and the hands washed with an anti-bacterial soap and running water as soon as feasible.
- 7.10.2 If blood or other body fluids accumulate on a soil surface, the area must be cleaned by removing the soil and placing it in a red biohazard bag. All visible signs of stained soil must be placed into the red biohazard bag(s).
- 7.10.3 If blood or other body fluids accumulate on a solid, impervious surface (concrete floor, counter, table, etc.) wipe up the spill with paper towels or other absorbent material. After the area has been wiped up, flood the area with a solution of 1 ½ cup of liquid

chlorine bleach to 1 gallon of fresh water (1 part bleach to 10 parts water) and allow to stand for 10 minutes. Do not pre-mix and store this solution, it must be mixed prior to immediate use.

- 7.10.4 If blood or other body fluids accumulate on a rug, it can either be handled as a biohazard waste and disposed of in a red biohazard bag or be washed with a strong germicidal chemical after it has been pre-cleaned.
- 7.10.5 Any items that come in contact with blood or other body fluids must be pre-cleaned and then disinfected using the 1:10 bleach to water mixture immediately after the incident.
- 7.10.6 If clothing becomes contaminated with blood or bodily fluids, remove as soon as feasible and place in a red biohazard bag. Items may be sent to a laundry service that is capable of handling this type of material. Once the items have been properly washed, they may be returned to the owner.
- 7.10.7 Individuals performing the decontamination must be properly protected with gloves, fluid proof suit and where applicable, respiratory protection and rubber boots. Goggles shall be worn over safety glasses or instead of safety glasses if splashing of blood or body fluids is likely. All personal protective clothing, gloves, boots, and respirator filters shall be handled as medical waste and placed in red biohazard bags. See Medical Waste Disposal section for proper disposal procedures.

7.11 Medical Waste Disposal

- 7.11.1 The selection of procedures for disposal of infective waste is determined by the relative risk of disease transmission and application of local, state, and federal regulations.
- 7.11.2 Wastewater from decontamination procedures may be carefully poured down a drain connected to a sanitary sewer where permitted.
- 7.11.3 All other infectious waste destined for disposal shall be placed in a closable, leak proof container or bag that is red in color and labeled using the biohazard label. It will be closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping. If outside contamination of a container or bag occurs or is likely to occur, then a second leak proof container or bag which is red, closable and labeled shall be placed over the outside of the first container/bag.
- 7.11.4 This type of material cannot go into the regular trash. This would be in violation of local, state, and federal regulations.
- 7.11.5 Clean Harbors or Laidlaw Environmental can be contracted for disposal of medical waste. This option of course can be expensive. Therefore, work with your local hospital and/or clinic to see if they will accept medical waste generated as a result of an incident.

7.12 Recordkeeping

- 7.12.1 All team member medical records will be kept confidential and will not be disclosed or reported without the team member's expressed written consent to any person within or outside the workplace, except as required by law.
- 7.12.2 Team member medical records shall be maintained for at least the duration of employment plus 30 years.
- 7.12.3 Team member medical records shall be provided upon written request of the team member or to anyone having written consent of the team member within 15 working days. Requests for medical records should be sent to OMC - Occupational Medical Consulting, RR 1, P.O. Box 3380, Leeds, Maine 04263, ATTN: Angela Berry. Availability and transfer of all records must be in compliance with the requirements set forth in 29 CFR 1910.1020 (h).

7.12.4 Team member training records must be kept for a period of three (3) years. Please send all training records to the Manager of Environmental Hazards in the Corporate Safety Department.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure a properly equipped first aid kit and the PPE required by this policy.

9 Related Documents

9.1 See attachments

EXPOSURE INCIDENT REPORT
PLEASE PRINT

Date Report Completed: _____

Exposed Team Member's Name: _____ Team Member #: _____

Home Phone: _____ Jobsite Name: _____

D.O.B.: _____ Job Title: _____

Exposed Team member's Hepatitis Vaccination Status: _____

Date of Exposure: _____ Time of Exposure: ____ AM ____ PM

Location of Incident (home, jobsite, clinic, street, etc.) Be Specific

Describe what task(s) were being performed when the exposure occurred - Be Specific

Was the exposed individual wearing Personal Protective Equipment (PPE)? Yes ___ No ___
If yes, list: _____

Did the PPE fail? Yes ___ No ___

If yes, explain how: _____

Which body fluids did the exposed individual contact (blood, vomit, etc.) Be Specific _____

What parts of the body were exposed or came in contact with the blood or potentially infectious materials? Be Specific

Estimate the percent (%) of body surface that was exposed: _____

How long was it exposed? _____

Did a foreign body (needle, auto part, machine part, wires, etc.) penetrate the skin? Yes ___ No ___

If yes, what was the object(s)? _____

Where did it penetrate? _____

Was any fluid injected under or into the skin? Yes ___ No ___ Unknown _____

If yes, what fluid? _____ How much? _____

What first aid activities were implemented after exposure? _____

Source individual identified? Yes ___ No ___

Name of source individual: _____

Source Hepatitis B vaccination status: _____

Did source individual agree verbally to be tested? Yes ___ No ___

Corporate Safety Notified? Yes ___ No ___

Name of Corporate Safety Person _____

Medical Evaluation on individual(s) performed? Yes ___ No ___

If yes, what is the name of the facility? _____

Signatures:

Exposed Team Member Foreman/Supervisor

Project Manager Area Manager

cc: Corporate Safety Department

SD1024

HEPATITIS B VACCINATION DECLINE FORM

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

Team Member's Signature

Date

Witness' Signature

Date

SD1023

Policy Number: 026**Authorized By:** Michael W. Bennett**Title:** Scaffold Safety is Everyone's Responsibility**Effective Date:** 06/01/97Page 1 of 17

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To eliminate the potential for injury while erecting, inspecting or using any type of field erected work platform or scaffold.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Authorized Scaffold User: One who has been trained on the use of the particular scaffold and who understands the limitations and configuration of that scaffold. Authorized scaffold users may also be deemed competent persons if they meet the definition competent person in 4.4 below.
- 4.2 Bearer (putlog): A horizontal traverse scaffold member upon which the scaffold platform rests and which joins scaffold uprights, posts and similar members.
- 4.3 Brace: A rigid connection that holds one scaffold member in a fixed position with respect to another member or to a building or structure.
- 4.4 Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to team members and who has the authorization to take prompt corrective measures to eliminate such conditions. Competent Scaffold Persons will be deemed competent as an erector, an inspector, or a combination of the two.
- 4.5 Coupler: A device for locking together the tubes of a tube and coupler scaffold.
- 4.6 Equivalent: Alternate designs, materials or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for team members than the methods, materials or designs specified in the standard.
- 4.7 Heavy Duty Scaffold: Rated for loading between 51# and 75# per square foot.
- 4.8 Light Duty Scaffold: Rated for loading up to 25# per square foot.
- 4.9 Longitudinal Bracing: Bracing parallel to the long side of the scaffold so the X runs the same direction as the long side of the scaffold.
- 4.10 Maximum Intended Load: The load of all persons, equipment, tools, materials, transmitted loads and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

- 4.11 Medium Duty Scaffold: Rated for loading between 26# and 50# per square foot.
- 4.12 Qualified Person: One who by possession of a recognized degree, certificate, professional standing or with extensive knowledge, training and experience has successfully demonstrated his or her ability to solve problems related to the subject matter, the work or the project.
- 4.13 Runner (ledger or ribbon): The lengthwise horizontal spacing or bracing member which may support the bearers.
- 4.14 Scaffold: Any temporary elevated work platform.
- 4.15 Traverse Bracing (cross bracing): Bracing at right angles to the long side of the scaffold so the X is in the interior scaffold space between the parallel uprights.

5 Policy

- 5.1 All of our team members and subcontractors working on any scaffolding or work platform in use in our work areas shall comply with all OSHA standards and this policy.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Planning the Activity

- 7.1.1 Prepare Job Activity Plans with input from each team member and the safety specialist. In many cases it is required that the manufacturer actually design the scaffold configuration. Identify the competent person in the activity plan. Refer to Section 7.10 "Competent Person and Training."
- 7.1.2 Survey the jobsite or work area before each activity to determine ground conditions, strength of structures, and general site conditions such as weather, overhead obstructions, power lines, and other work activities.
- 7.1.3 Order scaffolding that best fits the job requirements.
- 7.1.4 Upon delivery inspect all scaffolding and check for:
- Excessive rust and metal fatigue
 - Straightness of members and weld integrity
 - Inspect coupling pins for alignment and locking devices on frames/braces
 - Inspect center pivot on cross braces
 - Inspect caster brakes
 - All required pieces are present including manufacturers erection and user instructions

Remember: Fall Protection - Your life may depend on it!

- 7.1.5 The 100% tie off policy is in effect while scaffolding is being erected or dismantled. The competent person must determine proper fall protection including anchorage points. As a last resort the competent person may authorize tie off to scaffold components, however only to structural members of the scaffold. General rules and safety tips must be followed for scaffold and work platform assembly and dismantling. An authorized competent person must inspect and tag the scaffolding at the beginning of each shift as safe to use, safe to use with tie off, or incomplete – do not use. Remember, the goal is to create a complete work platform where harnesses and lanyards will not be required.

7.2 Types of Scaffolding

7.2.1 Listed below are some of the common types of scaffolding that we use. For more types of scaffolds and other definitions, see section 1926.450 of the OSHA standards.

- Fabricated Frame Scaffold (tubular welded frame scaffold) – A scaffold consisting of a platform(s) supported on fabricated end frames with integral posts, horizontal bearers, and intermediate members.
- Quick Erect Scaffolds— A type of system scaffold designed to be fast, easy to erect and dismantle.
- Mobile Scaffolds— A powered or unpowered, portable, caster or wheel-mounted supported scaffold.
- Supported Scaffold— A scaffold consisting of posts with fixed connection points that accepts runners, bearers, and diagonals that can be interconnected at predetermined levels.
- System Scaffold— A scaffold consisting of posts with fixed connection points that accepts runners, bearers, and diagonals that can be interconnected at predetermined levels.
- Tube and Coupler Scaffolds— A supported or suspended scaffold consisting of a platform(s) supported by tubing, erected with coupling devices connecting uprights, braces, bearers, and runners.

7.3 General Requirements for all Scaffolds

The general requirements listed in this section III may not be all inclusive and you should refer to OSHA Standards 29 CFR 1926.450 through 454 and 1915.71 (if marine work) for additional requirements. The manufacturer's erection and user instructions must be available on each project for each type and brand of scaffold that will be used.

7.3.1 Capacity

- Each scaffold must support own weight and 4 times the maximum intended load.
- Suspension ropes and hardware must support 6 times the maximum intended load.

A Qualified Person is one who by possession of a recognized degree, certificate, or professional standing, or with extensive knowledge, training and experience, has successfully demonstrated his or her ability to solve, or resolve problems related to the subject matter, the work, or the project.

7.3.2 Scaffold Platform Construction

- Platforms must be fully planked or decked with no more than 1 inch gaps or more than 9 1/2 inches where it is demonstrated by a competent person additional space is needed between the platform and the uprights.
- Scaffold platforms and walkways shall be at least 18 inches wide unless determined impossible by a competent person and would require standard guard rail system or PPE.
- The front edge of all platforms must be no more than 14 inches from the face of work except for plastering and lathing operations where no more than 18 inches is allowed.
- Platforms 10 feet and less in length must extend at least 6 inches but not more than 12 inches past supports unless designed and installed and/or guarded properly.
- Platforms longer than ten feet may extend up to 18 inches past support. Platform extensions over 18" require proper design, installation, and /or guarding.
- Overlap platforms must extend more than 12 inches over supports unless restrained to prevent movement.
- Each abutted end of planks shall rest on a separate support surface.
- On direction changes, any platform on a bearer at other than a right angle shall be laid first, and platforms which rest at right angles over the same bearer laid next.
- The top and bottom of wood platforms shall not be covered with opaque finishes. (Must be able to see wood grain through any finish.)

- Properly sized nails/bolts/wire will be used to secure planks, and railings. All nails will be driven to full length in a non-straight pull configuration.
- Mixing of different manufactured scaffold components must be approved by a competent person and compatibility and integrity of components must be maintained.
- All scaffolding shall have a safe means of access, using hook-on/attachable, stairway type ladders, stair towers, or the equivalent.
- Scaffold components may be modified provided a competent person determines structural integrity is maintained.
- Scaffold components of dissimilar metals cannot be mixed unless approved by a competent person.
- Before scaffold is used, the connections shall be inspected by a competent person.

7.4 Specific Scaffold Requirements

7.4.1 Criteria for Supported (Frame) Scaffolds

- The first guys, ties, and braces shall be installed when the vertical height is four times the minimum base dimension and then every twenty feet thereafter for platforms 3' wide or less and every 26' thereafter for platforms more than 3' wide. (See Appendix E and F)
- Guys, ties, and braces shall be installed at each end and horizontally not more than 30 feet apart.
- Supported scaffolds must be plumbed and adequately braced.
- Bracing must be installed as close as possible to the intersection of the bearer, and post, runner, and post.
- Transverse (cross) bracing shall be installed across the width of the scaffold every 3rd set of posts horizontally, every 4th runner vertically, and at scaffold ends.
- Longitudinal bracing shall be installed at approximately a 45 degree angle from the base of the first outer post to the extreme top of the scaffold. Longitudinal bracing must be repeated at every 5th post on continuous running scaffolds.
- Scaffold poles, legs, posts, frames and uprights must bear on base plates or other adequate firm foundations. Base plates are required at a minimum. Mudsills are also required unless on an adequate firm foundation (such as a concrete floor).
- Fabricated frame scaffolds, tube, and coupler scaffolds over 125 feet high shall be designated by a registered professional engineer.
- Building ties must be installed at bearer levels.
- Tube and coupler scaffolds must have positive locking type pins.
- Runners shall be located as close to the base as possible, interlocked to form continuous lengths, and coupled to each post.

7.4.2 Criteria for Suspension Scaffolds

- Support devices shall be capable of supporting at least four times the load imposed.
- Outrigger beams, when used, shall be structural metal or equivalent and restrained against movement.
- Inboard ends of suspension beams shall be stabilized by bolts or other direct connections to the floor or roof deck and evaluated by a competent person.
- Suspension rope on winding drum hoists shall not contain less than four wraps of rope at the lowest point of scaffold travel. Suspension ropes used with other types of hoists shall have a designed/provided means to prevent the rope end from passing through the hoist.
- The use of repaired or damaged rope is prohibited.
- Ropes shall be inspected by a competent person prior to each work shift and after any occurrence possibly affecting a rope's integrity.
- Gasoline-powered equipment and hoists shall not be used.
- Braking devices shall be automatic when an instantaneous change in momentum, or accelerated over speed occurs.
- Manually operated hoists require positive crank force to descend.
- Two-point and multi-point scaffolds shall be tied or secured otherwise to prevent from swaying and inspected by a competent person.

- Devices whose sole function is to provide emergency escape and rescue shall not be used as working platforms.

7.4.3 Mobile Scaffolds

- Shall be braced by cross, horizontal or diagonal braces to prevent racking or collapse and to automatically square and align the vertical members.
- Shall have all brace connections secured and shall be plumb, level and square.
- Scaffold casters/wheels shall be equipped with positive locking devices to prevent movement while in use.
- Manual force used to move the scaffold shall be applied as close to the base as possible and no higher than five feet.
- Only power systems designed to move mobile scaffolds shall be used. Do not use forklifts, trucks, etc.
- Team members shall not be allowed to ride on scaffolds.
- Platforms shall not extend outward beyond the base supports unless outrigger frames or equivalent devices are used.
- Caster stems and wheel stems shall be pinned or positively secured to scaffold legs.

Note: Height to base width of the scaffold during movement is 2:1 or less unless specifically designed and constructed to exceed nationally recognized stability test requirements.

7.4.4 Requirements Related to Specific Types of Scaffolds

- Reference 1926.452 for additional requirements applicable to the specific type of scaffold you are going to use.

7.5 Scaffold Access and Ladders

7.5.1 When scaffold platforms are more than two feet above or below a point of access, portable ladders, hook-on ladders, attachable ladders, stair towers, stairway-type ladders, ramps, walkways, integral prefabricated scaffold access, or direct access from another scaffold, structure, personnel hoist, or similar surface shall be used. An opening in the railing or perimeter barrier must be provided with a swing gate if feasible at each access point. Climbing over railings shall be avoided as a means of access. The swing gate will be the access closure of choice. If a swing gate can not be used then a JHA is required to identify how to access the location safely and requires approval from the senior manager (or designee) on site. Do not use cross-braces or framed corners as means of access. Access must be provided to all working levels of a scaffold.

7.5.2 Hook-on and Attachable Ladders

- Shall be positioned as not to tip scaffold.
- The ladder bottom rung shall not be more than 24 inches above the scaffold supporting level.
- Ladders extending more than 35 feet high shall have rest platforms at 35 foot maximum vertical intervals.
- Ladders shall be specifically designed for use with the type of scaffold used.
- Minimum rung length of 11 1/2 inches, uniformly spaced with a maximum spacing between rungs of 16 3/4 inches.

7.5.3 Stairway Type Ladders

- The bottom step shall not be more than 24 inches above the scaffold supporting level.
- Rest platforms shall be provided at 12 foot maximum vertical intervals.
- Minimum step width of 16 inches (mobile stairway-type ladders may have minimum step width of 11.5 inches).
- Treads and landings must to be slip resistant.

7.5.4 Stair Towers

- The bottom step shall not be more than 24 inches above scaffold supporting level.

- Handrails shall be provided at all levels with adequate hand hold for team member grasping, surface smooth (free of objects which could puncture), at least three inches from other objects, and at least 28 to 37 inches high from the surface of the tread.
- Landing platforms at least 18 inches wide by 18 inches long at each level.
- Stairway between stair rails shall be at least 18 inches wide.
- Treads and landings have slip resistant surfaces.
- Stairways shall be installed between 40 and 60 degrees from horizontal.
- Riser height and tread depth shall be uniform within 1/4 inch.
- Stair towers are preferred over ladders for access to different levels.

7.5.5 Ramps and Walkways

- 6 feet or more above lower levels shall have guardrail systems that comply with sub part "M" (Fall Protection).
- Slope of ramp or walkway shall not be inclined more than one (1) vertical to three (3) horizontal (or 20 degrees above the horizontal).
- Slopes more than 20 degrees shall have cleats not more than 14 inches apart securely fastened.

7.5.6 Prefabricated End Frame Access

- Must be specifically designed and constructed for use as ladder rungs.
- Ladder rung length must be at least 8 inches wide, maximum spacing between rungs not to exceed 16 3/4 inches and uniformly spaced.
- Ladder must be free from obstructions such as scaffold planks extending over the end of the scaffold.
- Rest platforms provided every 35 feet.

7.5.7 Access for team member erecting or dismantling supported scaffolds

- A safe means of access shall be provided for each team member erecting or dismantling a scaffold.
- Hook on attachable ladders shall be installed as soon as scaffold erection has progressed to a point that permits safe installation and use.
- Tubular welded frame scaffold and frames with horizontal members that are parallel, level and not more than 22 inches apart vertically, may be used for access.
- Cross braces on tubular welded frame scaffolds shall not be used for access.

7.6 Scaffold Use

7.6.1 Scaffolds and scaffold components shall be inspected by a competent person before each work shift and after any occurrence resulting in possible damage to the scaffold. See SD1054 for a basic inspection checklist available on Cianbro.net/Resources/Forms. A scaffold tag shall be placed at all points of access to the scaffold.

7.6.2 The use of shore or lean-to scaffolds is prohibited.

7.6.3 Never overload scaffold components beyond their rated capacity.

7.6.4 Scaffolds shall not be moved horizontally with team members on them.

7.6.5 Clearance between power lines:

A. Insulated Lines

- <300 volts→3 feet minimum
- 300 volts to 50 kV→10 feet minimum
- >50 kV→10 feet minimum plus 4.0 inches per 1 kV>50 kV

B. Uninsulated Lines

- <50 kV→10 feet minimum
- >50 kV→10 feet minimum plus 4.0 inches per 1 kV>50 kV

NOTE: Clearance closer than the above requirements is possible if a qualified individual coordinates the accomplishment of the following:

- Lines are deenergized and grounded.
- Lines are relocated.
- Lines have installed insulated protective covers.
- Lines are of the insulated, armored, shielded cable type.

7.6.6 Scaffolds shall be erected, moved, dismantled or altered only under the supervision and direction of a competent person and these activities shall be performed only by experienced and trained team members selected for such work by the competent person.

7.6.7 Team members are prohibited from working on scaffolds covered with slippery materials like ice, snow, oils, except as necessary for removal of such materials.

7.6.8 Suspension ropes shall be protected from heat sources or corrosive substances.

7.6.9 It will be the determination of the competent person or designer whether scaffold components can be altered.

7.6.10 Scaffold work is prohibited during storms or high winds unless a competent person determines it is safe. The practice of covering scaffolds with plastic, etc. increases the wind load on a scaffold dramatically and must be evaluated by a competent person.

7.6.11 Debris cannot accumulate on platform. Regular housekeeping/clean up is required.

7.6.12 Makeshift devices shall not be used on top of scaffold platform to increase height for team members.

7.7 Fall Protection

7.7.1 Each team member on a scaffold more than six (6) feet above a lower level shall be protected from falling to that lower level.

- Each team member on a boatswain's chair, catenary, needle beam, or ladder jack scaffold shall be protected with a fall arrest system.
- Each team member on a single-point or two-point adjustable suspension scaffold shall be protected by both personal fall arrest and a guardrail system.
- A competent person shall determine the fall protection/prevention requirements needed for erecting or dismantling scaffolding >6 feet. As a last resort the competent person may authorize tie off to structural members of the scaffolding. A fall arrest system shall be used unless a complete fall prevention system is in place.

As a last resort the competent person may authorize tie off to structural members of the scaffolding. Fall arrest system shall be used unless a complete fall prevention system is in place.

- Vertical lifelines used for fall protection shall be anchored to a fixed point independent of the suspended scaffold anchor point. Safe anchorage points include structural members of a building and not stand pipes, vents, piping systems, electrical conduit, outrigger beams, or counter weights.
- Scaffolding top rails manufactured after January 1, 2000 must be 38 inches to 45 inches high (42 to 45 inches for marine work).
- It is unacceptable to use cross bracing in lieu of top or mid rails on scaffolding.
- A competent person must determine adequate tie off points while erecting, dismantling, or using a scaffold. Tying off to the scaffold is the last resort. The scaffold must be secured from tipping by guying, bracing etc., before using it as an anchorage point.

7.8 Falling Objects Protection

7.8.1 Protection from falling objects shall be provided by the use of toe boards, screens, guardrail system, debris nets, catch platforms, canopy structures, or deflecting devices.

- 7.8.2 Areas below scaffold where objects could fall shall be barricaded off unless scaffold edges/sides can be adequately protected with toe boards and/or paneling/screening provided along scaffolding sides.
- 7.8.3 Canopies, debris nets, or catch platforms with sufficient strength to withstand impact forces expected can be used over team members working below for protection.
- 7.9 Scaffold Inspection/Tagging
(See Appendix G)
- 7.9.1 A competent person is required to monitor and be responsible for all scaffolding use activities. The competent person shall be responsible for affixing a tag to each scaffold that identifies the status of use.
- **Red** Tag indicates that the “Scaffold is incomplete or uninspected: DO NOT USE!”
 - **Yellow** Tag indicates that the “Scaffold has been inspected and is safe to use, but requires 100% tie-off!”
 - **Green** Tag indicates that the “Scaffold has been inspected and is safe to use, without 100% tie-off!”
- 7.9.2 Each tag will reflect the competent person’s name and date when tag was fixed. Each day the scaffold is to be used, the competent person must inspect the scaffold and initial and date the tag.
- 7.9.3 Do not use any scaffold that has not been tagged to reflect use instructions or has not been inspected by a competent person for the day you plan to use it.
- 7.9.4 Remember: All scaffolding (temporary elevated work platforms) must be inspected daily including wooden or “stick-built” structures where team members must work.
- 7.10 Competent Person and Training
- 7.10.1 A competent person is one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measures to eliminate such conditions.
- 7.10.2 Every team member performing work on a scaffold must be trained by a competent person to recognize the hazards associated with the type of scaffold being used. This can be accomplished through the activity planning process or other formal training and shall include at a minimum the following areas:
- Electrical hazards
 - Fall hazards
 - Falling objects protection systems
 - Erecting, maintaining, and disassembling fall protection systems
 - Proper use of scaffold and material handling on scaffold
 - Maximum intended load and load-carrying capacities of the scaffold being used.
- 7.10.3 Every team member involved in erecting, disassembling, moving, operating, repairing, or inspecting scaffolding shall be trained by a competent person to recognize any hazards associated with the work in question. This can be accomplished through the activity planning process or other formal training and shall include at a minimum the following areas:
- Correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining scaffolds.
 - Design criteria, maximum intended load-carrying capacity, and intended use of scaffold.
- 7.10.4 Retraining should be done as necessary when changes at the worksite present a new hazard(s) and/or to restore proficiency. This can be accomplished through daily activity planning reviews with all workers involved.
- 7.10.5 Training guidelines can be found in Appendixes A through D to subpart L and form SD1025 available on Cianbro.net/Resources/Forms. These guidelines can be used as references for competent persons to use in conducting training.

7.11 Safety at Home

When using scaffolding or temporary work platforms at home remember to follow the same safety precautions that we use at work. Build the platforms level, plumb and strong enough for the application. Protect yourself and others from falling and from falling objects. Inspect it each day before use.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

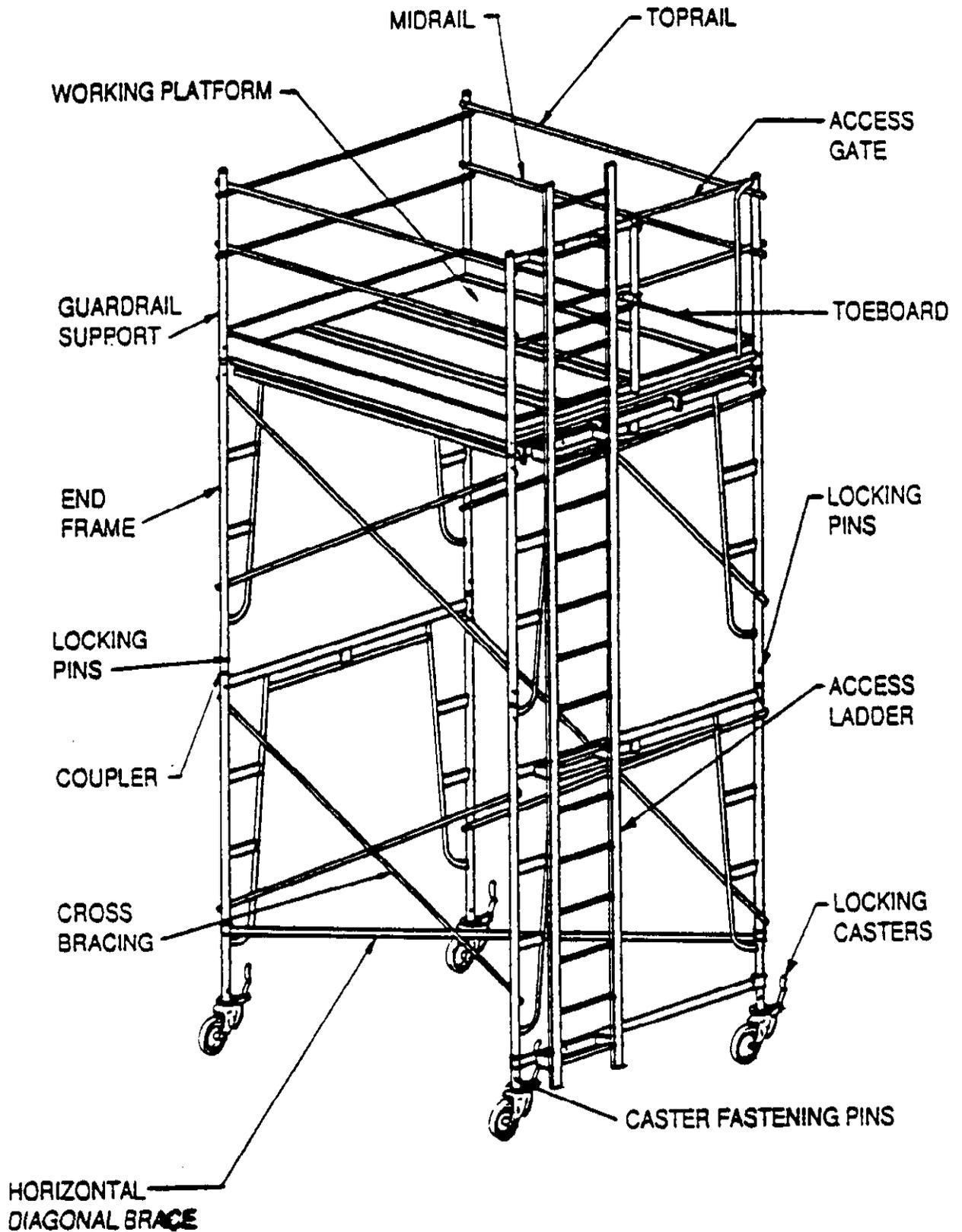
9.1 See attachments.

9.2 Documents available on Cianbro.net/Resources/Forms.

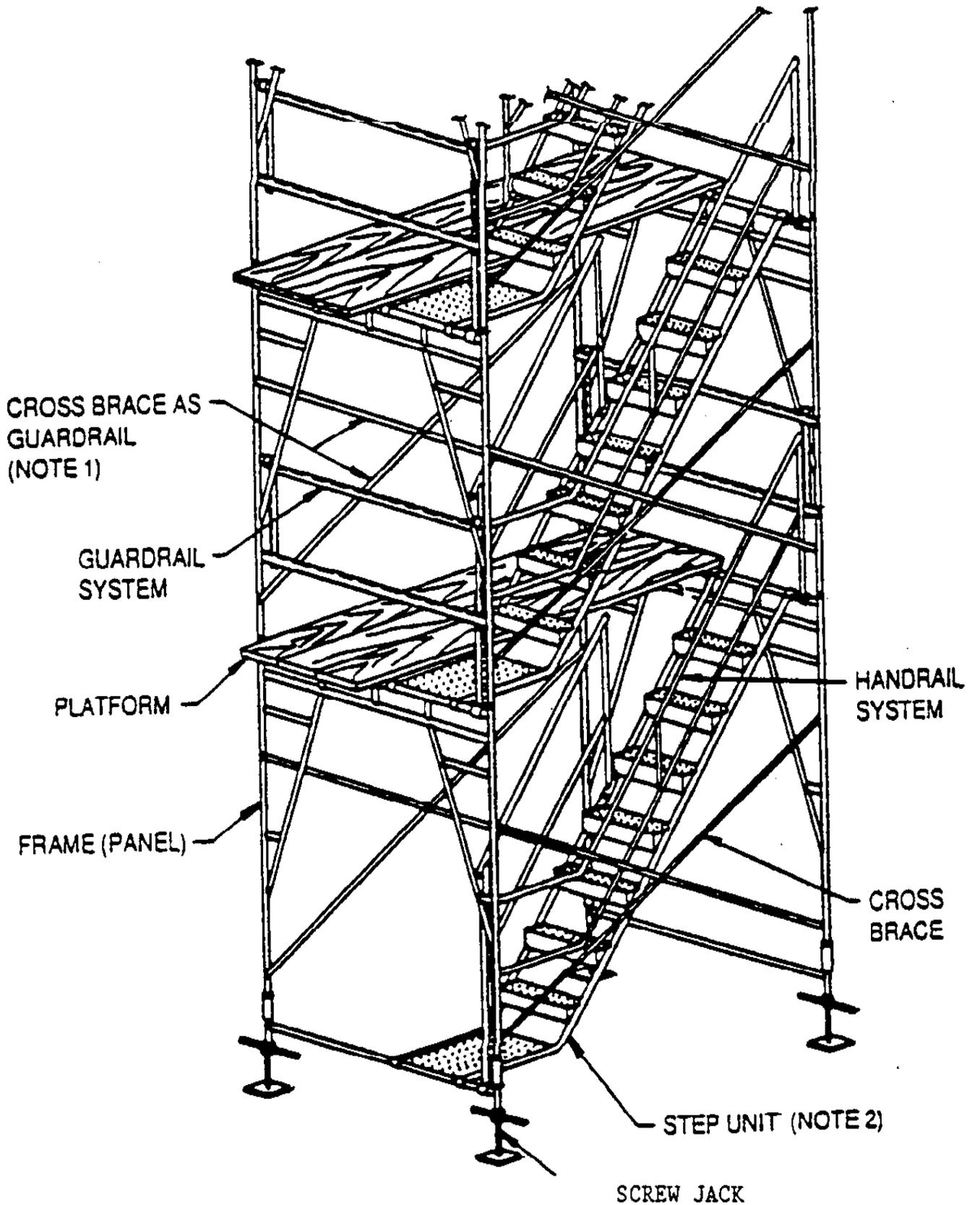
Scaffold User Training Quiz	SD833
Competent Person Scaffold Inspection Checklist	SD1025

9.3 Scaffold User Training Quiz Answers SD834 located on [Cianbro.net| Resources| Safety Resources](http://Cianbro.net/Resources/SafetyResources)

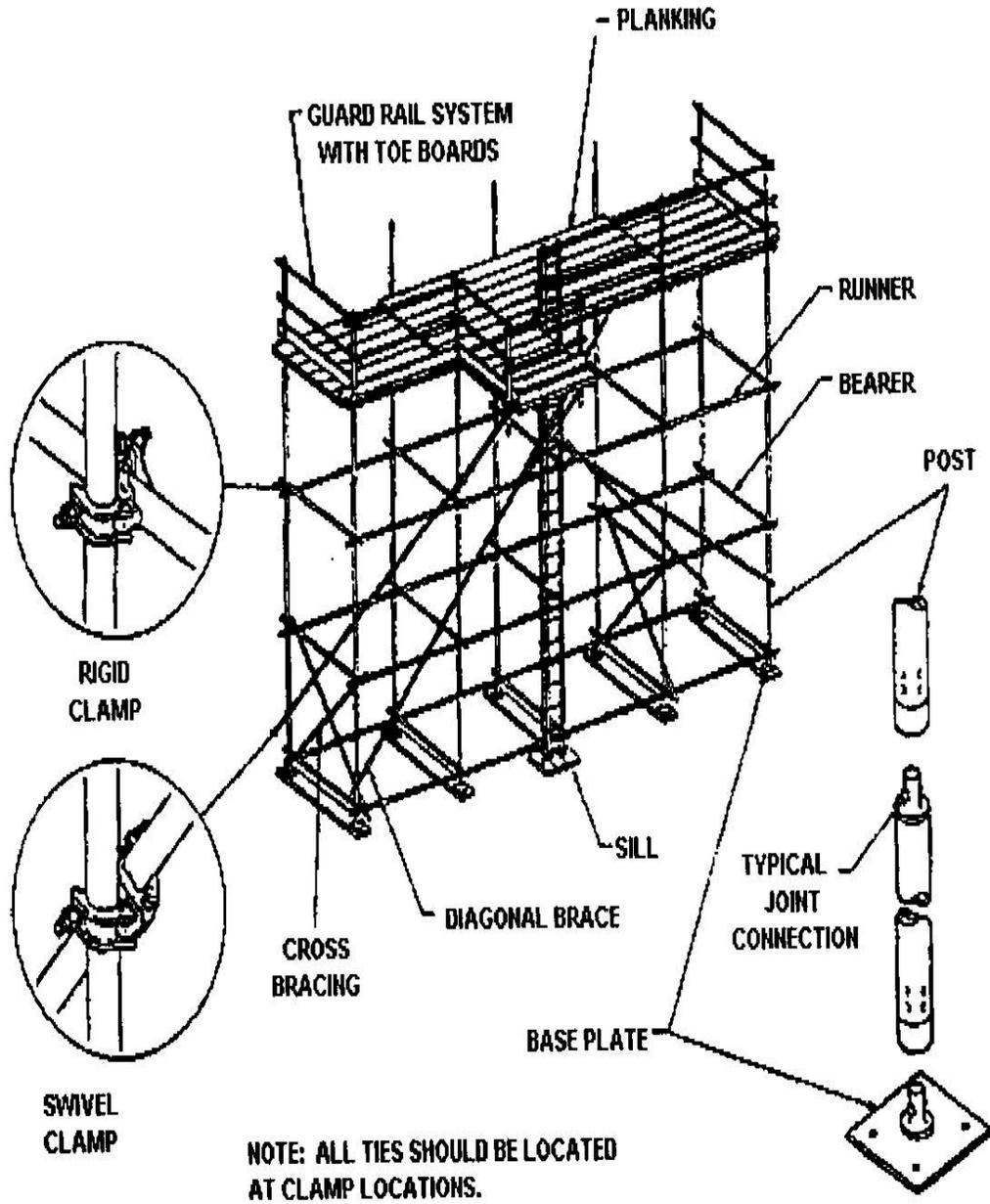
Mobile Scaffolding



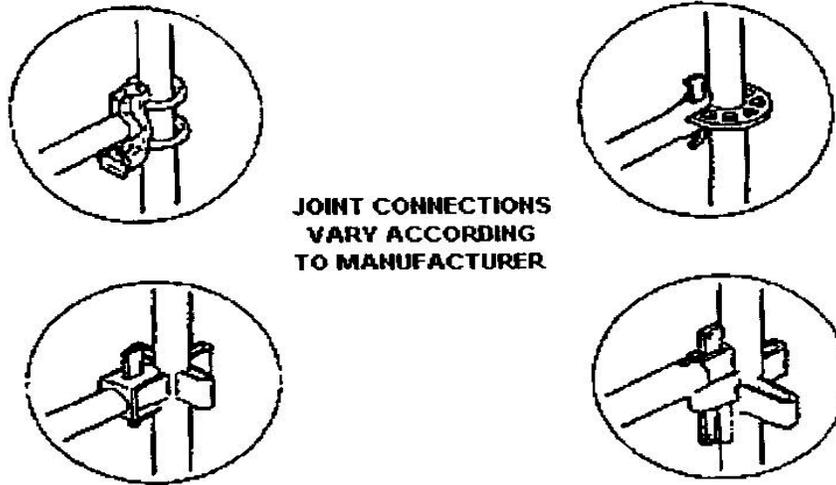
Frame and Stair Unit



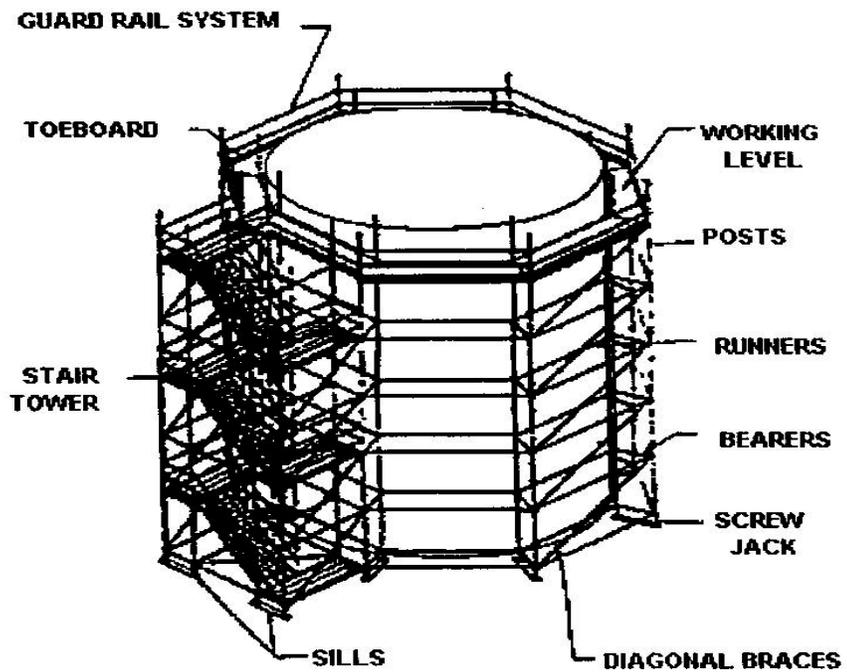
Tube and Coupler Scaffold



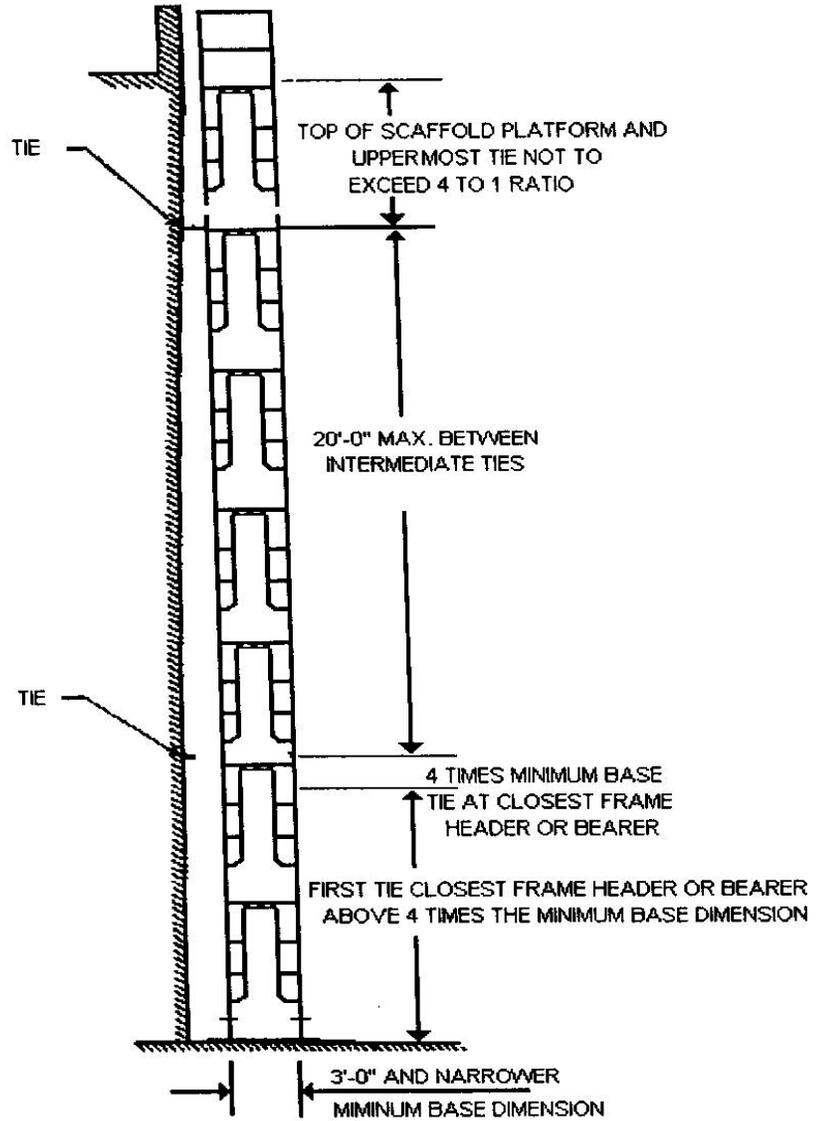
System Scaffold



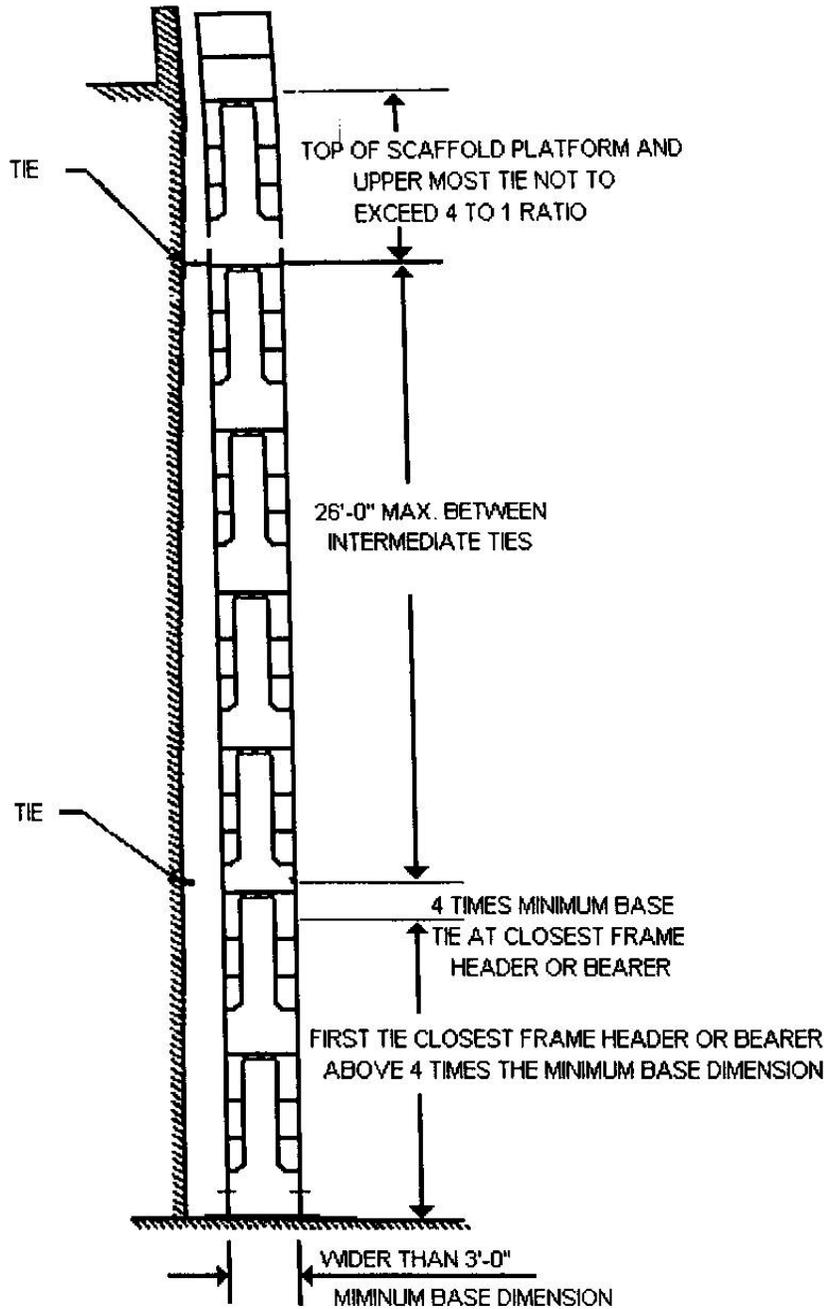
**JOINT CONNECTIONS
VARY ACCORDING
TO MANUFACTURER**



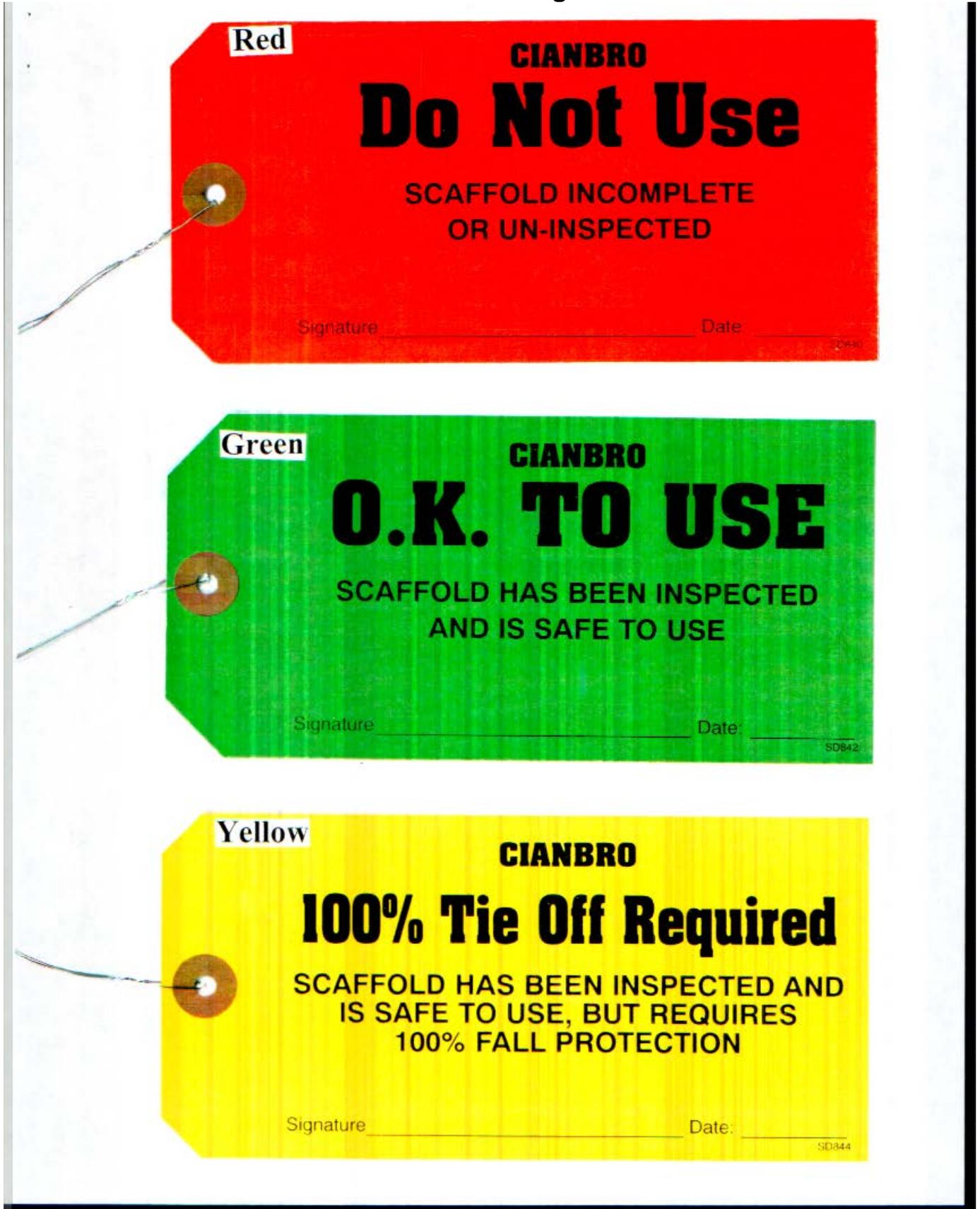
Maximum Vertical Tie Spacing Narrower 3'-0 and Narrower Bases



Maximum Vertical Tie Spacing Wider Than 3'-0" Bases



Cianbro Scaffold Tags



Policy Number: 027**Authorized By:** Michael W. Bennett**Title:** Guidelines for Establishing a Safety Health Awareness
Raises Excellence Committee (S.H.A.R.E)**Effective Date:** 03/01/92Page 1 of 4

1 Status

1.1 Update of existing policy, effective 06/04/15.

2 Purpose

2.1 To actively engage team members at all levels on the project and the execution of the Health & Safety program.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 S.H.A.R.E = Safety and Health Awareness Raises Excellence

4.2 Regional Committee = Geographical Location representing multiple Business Units and/or Markets

5 Policy

5.1 All work locations will have an active SHARE committee.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Committee Purpose

- 7.1.1 A project S.H.A.R.E committee will be established to support the company's commitment to ensuring the health and wellbeing of our team members and our business partners.

7.2 S.H.A.R.E Membership

- 7.2.1 The project S.H.A.R.E Committee shall be comprised of at least three members plus the management sponsor and Safety Specialist. Membership should change periodically as determined by the Manager/Superintendent depending on the duration of the job.
- 7.2.2 The management sponsor (a permanent member) has the authority to carry out the recommendations of the project S.H.A.R.E Committee.
- 7.2.3 A chairperson, C.A.P.P facilitator and secretary will be elected by majority vote of the project SHARE Committee members. (On smaller jobs two or three positions may be held by the same person.)
- 7.2.4 The chairperson shall coordinate activities associated with the project S.H.A.R.E committee. The management sponsor should not serve as the chairperson, C.A.P.P facilitator or secretary.
- 7.2.5 Sub-committees may be appointed by the chairperson to handle special projects with approval of the Manager/Superintendent.
- 7.2.6 One member of the project S.H.A.R.E. committee will be appointed to serve as a member of the regional S.H.A.R.E. committee and report project safety and health activities at each regional S.H.A.R.E committee meeting.
- 7.2.7 One member of the regional S.H.A.R.E. committee will be appointed to serve as a member of the corporate S.H.A.R.E. committee and report on the collective safety and health activities within the Business Units and/or Markets in their geographic area.

7.3 Duties and Responsibilities

- 7.3.1 The chairperson for project committees shall schedule meeting times at least bi-weekly. The chairperson for regional committees shall schedule meeting times at least monthly. The chairperson for corporate committees shall schedule meetings at least quarterly.
- 7.3.2 Recommend health & safety goals and incentives based on leading indicators as outlined in Policy #052 to the Project Manager and monitor the project progress. Monitor and review the safety and health standards and practices at each work location. This committee is responsible to report their activities to the respective Manager/Superintendent on a regular basis.
- 7.3.3 Review incidents and near misses from previous week(s) and make recommendations for corrective action.
- 7.3.4 Review written activity plans for hazard analysis/solutions and make recommendations.

- 7.3.5 Conduct bi-weekly jobsite inspections of work areas and make recommendations for corrective action.
- 7.3.6 Establish site specific goals for the safety and health process. (ie: number of observations per team member, contact rates, number of trained observers, action plans developed, incident rates, daily activity planning, hazard identification/solution recognition, health recommendations process, support wellness program and assist with health education, etc).
- 7.3.7 Monitor observations for quality. Improve quality of observations by assigning coaches to observers.
- 7.3.8 Set up S.H.A.R.E. safety policy and procedure board for postings to provide feed back weekly.
- 7.3.9 Review observation and hazard identification reports periodically, with a focus on safety and health at-risk behaviors and hazard recognition/solution identification.
- 7.3.10 Develop action plans for the highest safety and health At-Risk behaviors and major risk areas.
- 7.3.11 Provide project S.H.A.R.E reports routinely to the regional oversight committee; should include:
- Observation reports
 - Jobsite hazards and solutions
 - Investigations, lessons learned and recordable lessons learned
 - Action plans reviewed and implemented
 - Recommendations for improvement of safety and health efforts
 - Cost/savings ideas for safety and health programs
- 7.3.12 Identify any safety and health issues, physical/health hazards and develop action plans.
- 7.3.13 Act on special assignments as directed by the work location Manager/Superintendent.
- 7.3.14 A member of the project S.H.A.R.E Committee shall report all activities of the committee regularly at safety and health meetings.
- 7.3.15 The committee secretary shall document committee activities and meeting minutes. Meeting minutes will be posted for team member review within five days of the committee meeting.
- 7.3.16 Copies of all documented committee activities shall go to the Manager/Superintendent.
- 7.3.17 Communicate knowledge to others with signs, posters, bulletin boards, pamphlets, flyers, etc.
- 7.4 Authority
- 7.4.1 All S.H.A.R.E Committee members have the authority to provide oversight of safety activities by making recommendations to the project Manager/ Superintendent for ensuring safe and healthy working conditions.
- 7.4.2 Action plans developed by the S.H.A.R.E Committee shall be given to the project manager/superintendent for approval prior to implementing.

An effective S.H.A.R.E Committee must be driven enthusiastically by the desire to eliminate hazards, prevent injuries and improve jobsite safety and health standards.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide materials, PPE, and necessary training.

9 Related Documents

- 9.1 Not applicable.

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1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 This Safety Policy and Procedure outlines safe craning procedures to help ensure that any operator has the appropriate guidelines and safety policies at their disposal.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Caution Zone:** That Cianbro established area not less than 20 feet from energized power lines or it may be more than 20 feet depending on power line size (kV) (see 9.4 Appendix D.).
- 4.2 **Competent person:** One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measure to eliminate them. The competent person in charge of the lift is the lift director as per ASME (defined below).
Personnel responsibilities as per ASME American Society of Mechanical Engineers:
- All responsibilities listed below shall be assigned in the work site organization. A single individual may perform one or more of these roles.
 - Crane Operator: directly controls the crane's functions
 - Crane Owner: has custodial control of a crane by virtue of lease or ownership
 - Crane User: arranges the crane's presence on a worksite and controls its use there.
 - Lift Director: directly oversees the work being performed by a crane and the associated rigging crew.
 - Site supervisor: exercises supervisory control over the work site on which a crane is being used and over the work that is being performed on that site.
- 4.3 **Danger Zone:** When the crane working area is within the erected/fully extended boom length of the "*prohibited zone*", with the power lines energized.
- 4.4 **Fall Zone:** This means the area (including but not limited to the area directly beneath the load) in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident.
- 4.5 **Prohibited Zone:** That immediate area around energized power lines which is restricted from crane operations depending on power lines size (kV) (see 9.4 Appendix D).
- 4.6 **Qualified Evaluator (not a third party):** A person employed by the signal person's employer who has demonstrated that he/she is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.

- 4.7 Qualified Evaluator (third party): An entity that, due to its independence and expertise, has demonstrated that it is competent in accurately assessing whether individuals meet the Qualification Requirements in this subpart for a signal person.
- 4.8 Qualified Person: A person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrated the ability to solve/resolve problems relating to the subject matter, the work, or the project.
- 4.9 Qualified rigger: A rigger who meets the criteria for a qualified person.
- 4.10 Throat Opening: Any distortion causing an increase in throat opening of 5% not to exceed ¼ in. (6mm) (or as recommended by the manufacturer.)

5 Policy

- 5.1 All crane activities shall comply with the specific manufacturer's specifications and limitations as well as this policy and the requirements set forth in ANSI B-30.5 and OSHA 1926.1400 Sub Part CC Cranes and Derricks in Construction regulations.
- 5.2 Prior to any work crane operators shall identify any hazards listed in this policy and fill out appropriate planning forms when needed.

6 Responsibilities

- 6.1 The top Cianbro Manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 Corporate Safety is responsible for maintaining this document.

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7.1 Developing the Activity Plan

Prior to starting any crane work, a detailed plan should be developed that identifies any potential hazards and the preventative measures appropriate to eliminate the hazard. Complex or extremely heavy picks, or picks in congested areas warrant extensive planning (critical picks). Activity Plans must include consideration of Owner specific requirements such as arbitrary increases to lifted loads or clearances to sensitive equipment or property.

7.1.1 Listed below are some items to consider when developing the activity plan:

- A. Crane location and swing area
- B. Proper rigging equipment and inspection
- C. When traveling cranes around jobsites with restricted operator visibility, (especially around/under power lines), a competent spotter(s) who is a qualified/certified Signal Person, must be assigned to walk the crane from the point of origin to its destination. Boom sections lowered and proper distances from obstructions must be maintained.
- D. Evaluate stability of material crane will set on following 1926.1402 Ground Conditions.
- E. Weight evaluation
 - Crane/hoist capacity - load/list charts
 - Combined weight of objects and rigging
 - Sling and rope capacities as rigged
- F. Critical lift plans:

Before making a critical lift, a critical lift activity plan including the applicable attached pre-lift checklist, shall be prepared by the crane operator, Lift director, qualified rigger and qualified signalperson. The plans shall be documented and a copy provided to the project manger or superintendent responsible at the jobsite. The plan shall be reviewed and signed by all team members involved with the lift.

G. Critical lift definition:

A non-routine crane lift, requiring detail planning and additional or unusual safety precautions. Critical lifts include lifts made when the load weight is 75% of the rated load chart capacity of the crane; Lifts which require the load to be lifted, swung or placed out of the operators view; or lifts made with more than one crane; lifts involving non-routine or technically difficult rigging arrangement; hoisting personnel with a crane or derrick; or any lift which the lift director, lift supervisor, or crane operator believes should be considered critical.

NOTE: Attachment checklists must be completed for weights being lifted >75% of the crane rated load chart capacity.

H. Engineering (lift should be calculated and sketched for training purposes.)

I. What other work is going on in the area. Are barricades, alarm systems - crane horn, etc. needed?

J. When working around power lines (within the "**Danger Zone**") we must follow Cianbro's requirements as described in section 7.2 below:

REMEMBER - No job is too big or too small for an activity plan.

7.2 Crane Signal Persons

7.2.1 Crane signal persons must be certified by a 3rd party organization (NCCCO or NCCER) or qualified by Cianbro. In all cases, the team member will have passed both a written and a practical exam. Documentation shall be maintained by the Cianbro Institute.

7.2.2 A signal person is required in the following situations:

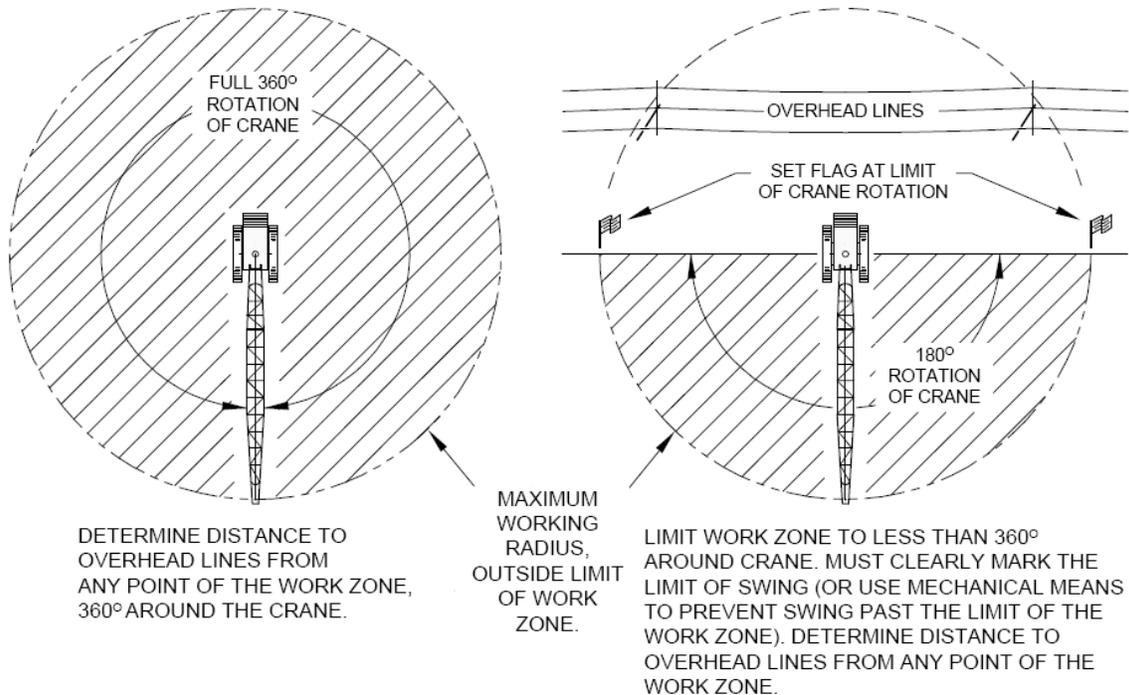
- The point of operation is not in full view of the operator
- The operator's view is obstructed when traveling
- The operator or the person rigging the load determines it is necessary.

7.3 Special Crane Safety Requirements for Overhead High Voltage Lines

7.3.1 Whenever there are overhead power lines on a job site, the following must be in place:

- Large clear signs shall be posted identifying the overhead lines.
- The working zone of the crane(s) shall be identified. If it is identified as a portion of the 360 degree maximum working radius of the crane, the working zone boundaries must be marked by flags or a device such as a range limit device or range control warning device.
- If the working zone is closer than 20 feet (or the voltage is known and you will be closer than the distance listed in Table A of Appendix D of this policy), then you must either: Have the line owner or operator de-energize and visibly ground the line or follow all of the requirements in 7.3.2, 7.3.3, and in Appendix D of this document. "STEPS YOU MUST TAKE TO MAINTAIN THE REQUIRED MINIMUM CLEARANCE DISTANCE" included in Appendix D of this policy.

CRANE WORK ZONE



- 7.3.2 The following steps shall be taken to eliminate the hazard of electrocution or serious injury as a result of contact between the energized power lines and the crane, load line or load within the “Prohibited Zone”.
- An on-site meeting between competent Cianbro person and a competent representative of the owner of the lines or a competent representative of the electrical utility should take place to establish the procedures to safely complete the operations.
 - Load control, when required, shall utilize tag lines of a non-conductive type (dry polypropylene).
 - A qualified/certified signal person(s), whose sole responsibility is to verify that the required clearance is maintained, shall be in constant contact with the crane operator.
 - No one shall be permitted to touch the crane or the load unless the signal person indicates it is safe to do so.
 - Operation of boom and load over electric power lines is extremely dangerous, due to perception of distance and multiple contact points as viewed from the position of the operator and/or position of the signal person. The operator should avoid operating the crane, with or without a load, in this area.
 - Devices such as ribbons, balls, etc. should be attached by a qualified person to the power lines to improve visibility, or equivalent means employed to aid in location of the prohibited zone.
- 7.3.3 Any time we are required to operate a crane or lifting equipment within the “**Caution Zone**”, a specific hazard activity plan shall be prepared by the assigned supervisor with input from the crane operator/rigger and safety person. The plan must be written, approved by the Senior Cianbro manager on site and reviewed with all individuals in the work area with a copy sent to the Corporate Safety Department.
- A. The activity plan shall include at a minimum those considerations and steps listed in section 7.1 above plus:
- Identify “**Caution Zone**” area boundary at least 20 feet from energized power lines. Depending on line size (kV) distance may be more than 20 feet.
 - Paint or use other visible methods to clearly designate **Caution Zone** area boundary along the ground from the power line to any portion of the equipment.

- A spotter that is a qualified/certified signal person shall be assigned to ensure equipment/loads never breach the prohibited zone from the power lines. The spotter, whose only function will be monitoring the distance, shall be in direct communication with the operator.
- Request owner or a designated representative of the electrical utility to cover lines (rubber boots or sleeves) in the immediate work area where incidental contact could occur. Applicable distance from lines shall be maintained.

7.3.4 When traveling crane with no load and boom or mast lowered the minimum safe distance from energized power lines up to 0.75 kV is 4 feet. Refer to Table T in 9.5 Appendix E for safe distances greater than 0.75 kV.

- A qualified/certified signal person must be assigned to monitor distance while traveling and be in direct communication with the operator.

7.3.5 Team member protection against electrical hazards.

- Shut off - tag out - ground lines, whenever possible.
- Rubber sleeves are appropriate - but not by themselves. The identified prohibited zone shall still be maintained.
- Large Overhead Power Lines identified with signs, flagging, etc.
- Avoid using areas under or in close proximity to power lines for laydown or storage areas.

7.4 Site Preparation

7.4.1 Prior to mobilizing crane in work area, the following should be considered:

- Access roads are adequately prepared.
- There is room to erect and/or extend the boom.
- Blocking is available to support the boom while it is being assembled and dismantled.
- The maximum radius, maximum loads and maximum lift height of each lift are known.
- If the crane is to be set up on a structure; the allowable structural loads are not exceeded by crane loads.
- Is there adequate swing clearance between the counterweight and any obstacles? (Should maintain a minimum of 2 feet.)
- Ropes or barricades are positioned to prevent entry into any part of the crane swing area.
- Operating locations are far enough away from shoring, excavations, trenches, buried utilities, foundations, etc., to eliminate risk of collapse.
- All erection, dismantling, and operating locations must be drained, graded, leveled and compacted so that, in conjunction with the use of supporting materials (if necessary), they meet the equipment manufacturer's specifications for adequate support and degree of level.
- All operating locations are graded, leveled and compacted.
- Public access to lift area is prohibited and barricades are available.
- Operating locations are chosen so that the minimum clearances from power lines are maintained by Cianbro and OSHA requirements. If not, the power lines must be either shut down and properly grounded or relocated by the utility company so that contact cannot be made. Refer to the section 7.2 Special Crane Safety Requirement. Overhead High Voltage lines."
- Persistent wind direction and wind speed can exert unplanned dynamic loading. Extreme caution must be exercised when lifting as wind speed increases.
- Proper leveling of crane.
- Hardwood mats or blocking are available if the ground is soft.
- Visibility for making lifts which could require tag person and/or radio communications.
- All "Caught Between" points are identified and eliminated if possible.

7.5 Tips for Setting up Cranes

(*Be sure to verify these basic points.*) Follow Cianbro's "Informational Safety Policy and Procedure" for assembling and dismantling cranes. All manufacturer procedures and prohibitions must be complied with when assembling and disassembling a crane. The assembly and disassembly must be directed by the Assembly/Disassembly Director.

- 7.5.1 Locate the hoist line over the center of gravity of the load being hoisted. This will allow the load to be lifted without "swinging". The center of gravity of the load will always position itself under the boom point. (Try this with the headache ball.) The boom tip must be situated directly over the load center of gravity (make sure the load line is always vertical).
- 7.5.2 Know the weight of the load. This may seem to be an obvious requirement, however, when investigating many accidents it has been learned that in many instances actual load weight differed considerably from the estimated weight. When making lifts over 75% of the rated load chart capacity, the load weight must be known exactly. Do not overlook the weight of the load block, cable and any other rigging, they are all part of the load weight. Always refer to the load charts for deductions.
- 7.5.3 The maximum load radius the machine will be working at or required to move the load must be known. The furthest load radius must be used to determine the lifting capacity of the crane from the load chart to ensure a safe hoisting operation. Remember, load radius is the horizontal distance measured from the "center of rotation" to the "center of gravity of the load".
- 7.5.4 Set up on firm, level footing. When outrigger floats are used, they shall be attached to the outriggers. Blocking under the outrigger floats, when required, shall meet the following requirements:
 1. Sufficient strength to prevent crushing, bending, or shear failure.
 2. Such thickness, width, and length, as to completely support the float, transmit the load to the supporting surface, and prevent shifting, toppling, or excessive settlement under load.
 3. Blocking shall only be used only under the outer bearing surface of the extended outrigger beam.

NOTE: If outriggers are not fully extended, use the "on rubber" capacity charts. For those cranes for which the manufacturer allows for intermediate outrigger placement, extend to those positions and set pin only, and be sure to use the appropriate chart for that position. Outrigger beams must be set in accordance with manufacture recommendations.

- 7.5.5 Level the crane. A few degrees out of level can cause serious side loading of the boom, especially at longer boom lengths. Also, when swinging loads towards the low side, the radius will increase causing greater "tipping" forces on the crane.

7.6 Critical Pick Planning

- 7.6.1 Before making critical picks we must evaluate the materials and equipment on the crane barge to check for weights, location and securing. All items need to be balanced to avoid any possibility of machine listing.
- 7.6.2 During the pick, all items that can affect the movement of the crane, load or barge, should be monitored (wind, current, wake, weather, etc.).
- 7.6.3 A list of all hazards and their solutions must be filled out in the Activity Plan.
- 7.6.4 Crane booms should be as short as possible for the lift.
- 7.6.5 Cranes radius should be short as possible and loads as close to the ground as possible.

- 7.6.6 Charts must be specific for a boom offset if it is being used.
- 7.6.7 All rigging and rigging equipment must be inspected prior to use.
- 7.6.8 Review all aspects of the Activity Plan with the crew to make sure of their understanding of the process.
- 7.6.9 Cianbro's Critical Lift Checklist must be completed.
- 7.6.10 Critical lifts should not be made in winds at 15 mph or above unless other special considerations are used.

7.7 Keeping Clear of the Load

- A. Where available, hoisting routes that minimize the exposure of team members to hoisted loads must be used, to the extent consistent with public safety.
- B. While the operator is not moving a suspended load, no team member must be within the fall zone, except for team members:
 - Engaged in hooking, unhooking or guiding a load;
 - Engaged in the initial attachment of the load to a component or structure; or
 - Operating a concrete hopper or concrete bucket.
- C. When team members are engaged in hooking, unhooking, or guiding the load, or in the initial connection of a load to a component or structure and are within the fall zone, all of the following criteria must be met:
 - The materials being hoisted must be rigged to prevent unintentional displacement.
 - Hooks with self-closing latches or their equivalent must be used.
 1. Exception: "J" hooks are permitted to be used for setting wooden trusses.
 - The materials must be rigged by a qualified rigger.
- D. Receiving a load: Only team members needed to receive a load are permitted to be within the fall zone when a load is being landed.
- E. During a tilt-up or tilt-down operation:
 - No team member must be directly under the load.
 - Only team members essential to the operation are permitted in the fall zone (but not directly under the load). A team member is essential to the operation if the team member is conducting one of the following operations and the employer can demonstrate it is infeasible for the team member to perform that operation from outside the fall zone:
 1. Physically guide the load;
 2. Closely monitor and give instructions regarding the load's movement; or
 3. Either detach it from or initially attach it to another component or structure (such as, but not limited to, making an initial connection or installing bracing.)

7.8 Cranes on Barges

Working with barge-mounted crane presents many challenging circumstances. Before putting any crane on a barge, appropriate engineering steps should be taken to determine that capacities and lists can be maintained within safe limits. Experienced team members, compatible equipment configurations, properly sized equipment and paying attention to details are critical to our success. Minimum barge list must always be the goal.

7.8.1 The following are a number of important procedures and considerations for working from barges:

- A. The proper list charts must be used for picks on the water. Land charts should never be used for marine operations.
 - A 1° list chart shall be used at a minimum unless all dynamic forces can be controlled during the lift. Any lifts requiring capacity chart of less than 1° needs to be an engineered lift.
 - List charts need to be specific to the crane that is being used. Example: List charts for the Manitowoc 4100W Vicon Series 3 Ringer come in 1/2°, 1° and 2° only. The 2° list must never be exceeded.
 - List charts must match the machine serial number.
 - Machine list and barge list both need to be considered together.

- B. Barge list is unknown until the crane has the entire weight of the load. Be prepared to set the load back down if necessary to reposition the crane. Barge list can be calculated by a qualified engineer.
- C. All methods to secure a load should be taken into consideration (i.e. cable load to front of barge, set load on another barge tied to front of crane barge, etc. before moving the crane barge).
- D. The crane should be balanced so the load or the counterweight does not affect the list or trim of the barge.
- E. Things to consider in the planning; (Remember: At 75% or more of the manufacturer. Recommendations, a qualified engineer must be involved in the planning.)
 - Wind – will not exceed manufacturer’s recommendations
 - Seas or wave action – should be “flat”
 - Tide or current conditions
 - Obstacles in the area
 - Always keep block tied back when not in use
 - Before leaving the crane unattended lower the boom to an intermediate angle
 - When leaving crane over night lower the boom to an intermediate angle with the ball or block attached to the barge with adequate rigging. Crane should be balanced with list and trim close to zero or zero
 - Marine traffic – should be controlled
 - Weight calculations
 - Power lines over head
 - Under water / underground utilities
 - Check for water in barge compartments – pump out if necessary
 - Fuel in the equipment
 - Access to the barges

Note: Remember that load charts are for 0 wind, 0 wave action, 0 current and equipment in safe running condition.

7.8.2 Guidelines for Barge Selection and Use

The crane should be located in the center of the barge to minimize machine list. If it cannot be avoided, the crane may be located towards one end of the barge with engineering assistance in estimating machine list and ballast requirements.

- A. The barge needs to be approved for use with the crane by an engineer.
 - Items to include in the planning:
 - Materials needed on the barge.
 - Equipment to be placed on the barge.
 - Conex boxes and contents.
 - Loading and unloading of the crane (Ramps required?)
 - Boom length (can the crane place things onto the barge?)
- B. Placement of spuds
 - Keep the working end clear of spuds.
 - Determine spud length needed and add 10’.
 - Consider what will lift the spuds – crane or winches. (Place power pack so the winch operator can see the spuds).
- C. Number and placements of cleats
 - For heavy loads, hand lines can be tied off.
 - Tug or push boat tie-off.
 - Need to include adequate number and placement.
- D. Channel conditions
 - Is channel big enough to accommodate the barge?
 - Consider obstacles in the way of the pick / swing areas.
 - Is the water deep enough in all areas of the move?

- E. Barge list considerations
 - Can load be swung to the side without excessive listing?
 - Will tides or wake cause a concern with the barge?
 - Make certain we start with a 1° list chart.
- F. A drawing that is to scale should be used to show everything on the barge and how things will be moved during the pick.
- G. Tying down the crane:
 - A qualified engineer will design tie-downs.
 - Tie-downs will be designed so the crane can be moved if necessary.
 - Tie-downs are for securing the crane from sliding off the barge, not for anchoring the crane for a pick.

Can the barge accommodate all of the materials to be placed there or is a material barge needed? What size?

7.8.3 When moving cranes on barges with suspended loads and loads that are too heavy to swing over the side:

- A. Use a winch to rotate the barge to maintain complete control of the move unless the load is secured or resting on another barge. Securing the load will increase stability and limit movement. An engineer should be involved in the load securing methods and design.

Note: Extra caution should be used to ensure the boom tip is directly over the center of gravity of the load. The operator may have to raise the boom while hoisting the load to keep boom tip over the center of gravity of the load. (Make sure the load line is always vertical).
- B. When rotating a barge with a winch, with a suspended load on the crane, the winch operator needs to be positioned so that the load can be seen by the operator. This will allow the winch operator to make adjustments to the barge movement, helping to keep the load centered under the boom. The winch operator needs to be well trained – possibly a crane operator. Spuds should be up and pinned. The winch operator and the crane operator need to be in radio contact with each other.
- C. Set up the winch cables (and anchors) so the rotation of the barge can be completed without stopping and changing cables.
- D. The load should be lowered as soon as possible to make it more stable (the operator needs to know this).
- E. The crane swing-lock positive dog should not be engaged while raising, lowering or rotating the load. If the load starts to move slightly, the operator will maintain the ability to bring the load back to center. Any movement on the barge can cause list.
- F. Whenever possible, spuds should not be raised once the crane has lifted the load. Moving the spuds may cause the barge to list. If the spuds need to be raised or lowered during the lift, they should only be moved together, at the same rate and after the rotation has been stopped.
- G. Use a Load Indicating Device or Load Moment Indicator to check calculated weights.
 - This is only another tool and should not be relied upon as the only method of determining the weight. Operator experience must also be considered.
 - The load weight needs to be calculated by a qualified person.
 - Do not rely on shipping weights alone.
 - St. Paul's Critical Pick Criteria is useful in determining accurate weights.

7.8.4 Guidelines for Wind and Current

A. When working in strong currents (around 4 knots) then the following should take place:

- The spuds should be placed across the current such that one spud does not take the entire load from the barge.
- Consider using anchors to assist the spuds.
- Find a protected area to secure the barge for the night or weekend (a dock, cove, etc.).
- When making a critical pick, check the barge list prior to making the lift. Current or tidal flow can affect the list.
- A wind meter (anemometer) should be used to measure wind speed.
- Loads that have a large surface area, such as a building or large girder become a large sail. Special precautions should be taken to secure the load with air tuggers, winches or something that blocks the wind.
- Never exceed the manufacturer's recommendations for wind speed.
- Wind speed usually increases with elevation.
- Wind can cause swells and waves. Take this into consideration before making the pick.

Wind and current should be monitored throughout the pick process

7.8.5 Cranes on barges with spuds:

- When lifting a spud that has set overnight, or when it has settled into the mud, a minimum of a two-part line or block to lift the spud must be used.
- With cranes that only have two single part lines, then both lines should be used together.

7.8.6 Securing the barge:

- Make sure the barge is in a safe location and spuds are down.
- Check all mooring lines.
- Place lights with adequate power supply on barge perimeter.

7.9 Crane Failures and Upsets

7.9.1 Over 50% of all mobile crane failures and upsets are caused by:

- Failure to use outriggers.
- Failure to fully extend outriggers.
- Failure to get wheels off the ground.
- Failure to level the crane.
- Poor ground conditions.
- Improper blocking beneath the outrigger floats.
- Not knowing load weight/Picking more than chart will allow.

7.10 Inspection and Maintenance: A Part of Safety

7.10.1 Qualified and competent operators shall perform a safety inspection before putting any Cianbro or rental crane into service. Use a Cianbro Equipment Inspection form to document this inspection. This inspection must be repeated on a monthly basis. Also, OSHA regulations require a daily inspection of the following: (Daily inspections, use Cianbro's operators safety inspection card (SH 925)) ASME 5-2.1.2 Frequent Inspection. All safety devices must be in proper working order before the crane can be operated.

- All control mechanisms for proper functioning.
- All safety devices for malfunction (anti-two block device, boom hoist kickout, load indicators, etc. for cranes so equipped).
- Air and hydraulic lines and fittings for deterioration.
- Operator's manual, operating speeds, and other required safety and warning decals in place and visible.

- Load charts legible and fixed in a location visible to the operator while seated at the controls.
- The presence of an accessible fire extinguisher (10 BC rated) inside the cab for emergency use.

7.10.2 Cianbro's crane maintenance program requires that the following be completed, including all rental equipment:

- Proper lubrication
- Adjustments
- Repairs
Crane parts and components shall not be modified without the manufactures approval.
- All sources of energy that could interfere with the safe maintenance and/or repairs of crane components must be positively locked and tagged (ZES state) out at the energy source prior to performing maintenance or repairs.
- Remove key from the ignition switch. Turn off the master switch. Put key on the master switch lock with a tag.
- Monthly inspections must be completed on critical items in use such as brakes, crane hooks, and running ropes. This certification record must be kept readily available (use equipment inspection form (OP410). Crane hooks with deformation or cracks will not be used and must be replaced.
- Annual inspections are done and recorded immediately following assembly or any changes to the cranes configuration before use. Use the new Annual Inspection Form (forms are located on www.cianbro.net Resources| Forms).
- Documented load tests must be completed and maintained whenever a major repair is completed, annually, or whenever a third party inspection is required for maritime operations (whichever comes first). The documentation must show the test procedures and confirm the adequacy of any repairs or alterations needed.
- Wire rope/rigging and boom inspection.
- One of the most important pre-operational checks to be made on the crane is the wire rope/rigging and boom inspection. Assurance of safety and good condition of the equipment requires a program of periodic inspection of all wire rope and fittings. Refer to Cianbro's "Safe Rigging Operations" Safety Policy and Procedure.
- All rope which has been idle for a period of one month or more shall be given a thorough inspection by an authorized person before it is put back into service.
- The time to remove a rope from service is related to the conditions of the particular installation. These conditions include the size, nature, and frequency of the lifts and when the next inspection will be.
- All inspections are the responsibility of the operator. Call Cianbro's Safety Department or the Equipment group with any questions about maintenance and inspection requirements.
- All slings must be inspected for damage/defects each day (shift) before use.

7.10.3 Modifications or additions that may affect the capacity or safe operations of the equipment require written approval from the manufacturer.

7.10.4 Crane safety is a very important part of any work activity. Operators and project management needs to accurately plan craning, at all times; ensuring safe working limits are maintained. Remember there are five reasons for crane incidents:

- Site selection/set up
- Load limits/rigging
- Inspection
- Maintenance
- Operator error

NOTE: For more information frequently review "Bob's Rigging and Crane Handbook", IPT's Crane and Rigging Handbook and/or for OSHA requirements labor Part 1926, 1400 Subpart CC.

7.11 Requirements for Crane Operators

- 7..1 Only crane operators approved by Cianbro shall be allowed to operate cranes for Cianbro. All Cianbro crane operators must be required to successfully meet the qualifications for the specific type of crane they are operating. Operators must meet the physical qualifications and operator requirements set forth in ASME B30.5 Section 5.3.1 including;
- A. Cianbro crane operators have the right and responsibility to refuse to lift a load if they believe it is not safe to do so. The crane operator shall notify the supervisor and/or the lift director. Together they will determine the safe way to complete the lift.
 - B. Physical qualifications must meet the following:
 - Adequate vision (with or without corrective lenses) and hearing (with or without a hearing aid) to meet the operational demands of the job.
 - The ability to distinguish colors, regardless of position, if color differentiation is required.
 - Sufficient strength, endurance, agility, coordination, and speed to meet the operational demands of the job.
 - Normal depth perception, field of vision, reaction time, and coordination.
 - Compliance with substance abuse testing criteria.
 - No evidence of physical defects, emotional instability, seizures, or loss of physical control that could interfere with the operator's performance.
 - Operator physicals to re-evaluate operator status are required every two years.
 - C. Operator testing and demonstration requirements must verify the following;
 - Satisfactory completion of a written exam covering operational characteristics, controls, and emergency control skills.
 - Demonstrate the ability to read, write, comprehend, and use arithmetic and a load/capacity chart.
 - Satisfactorily complete a written/verbal test on load/capacity chart usage for the specific type of crane they will operate.
 - Satisfactorily complete an operation test demonstrating proficiency in performing lifting, lowering, booming, telescoping, and swinging functions at various radii. Testing shall also include inspections, securing procedures, and traveling.
 - Demonstrate understanding of the applicable sections of the B30 Standard and other federal, state, and local requirements.
 - Crane operators designated as having appropriate "Offshore" experience and training will also understand the requirements of the American Petroleum Institute (API) 2D Standard.
 - Operators are required to be re-qualified if, at any time, management feels it is warranted or at intervals not to exceed 5 years per NCCCO requirements.
 - Refresher training for all crane operators will be conducted at intervals not to exceed 4 years. The training will consist of, at a minimum, topics including applicable changes to company, manufacturer, OSHA, ANSI or API standards, principles of operation, crane maintenance, inspections, hand signals, load charts, and fire extinguisher training.

7.12 Safety At Home

Make sure you maintain clearances from overhead power lines at your home. Do not carry ladders, poles or other objects when you are close enough that you could contact the overhead lines around your house.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

- 9.1 See attachments.

The following documents are available on Cianbro.net or Cianbro.net>Standard Operating Procedures – on the SOP.

008 Safe Rigging Operations	
Pre-Lift Checklist Land Based Cranes Only	SD1004
Pre-Lift Checklist Barge Mounted Cranes Only	SD1003
Pre-Lift Checklist Procedures for Overhead Cranes/Power Hoist	SD1005
Boom Truck Critical Lift Plan	SD1034
Pre-Lift Checklist for Two Cranes	SD1039
Pre-Lift Checklist Manual Hoist Exceeding 75% of Rated Capacity	SD1002

7.13 Crane Safety Rules Checklist

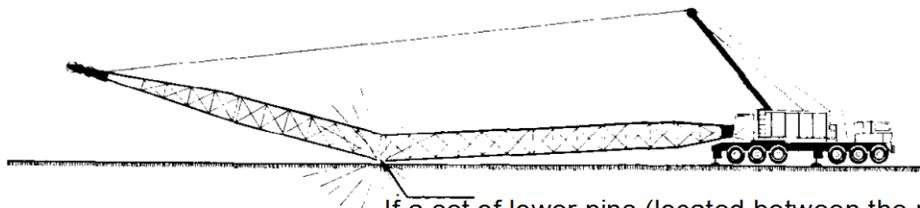
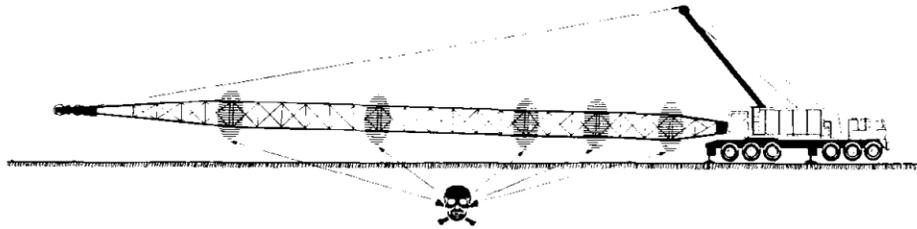
- Watch out for power lines (20' rule/"Danger Zone" Refer to attached policy.)
- Refer to Cianbro's Informational Safety Policy and Procedure for "Crane Assembly and Dismantling".
- Know the weight of the load.
- Know the pick and set zone radius.
- Know if you are in the structural or tipping portion of the chart.
- Perform pre-operational check of crane (daily/monthly/annual).
- Assign spotter when traveling crane.
- Set up on firm supporting surface.
- Provide adequate cribbing as necessary.
- Properly deploys all outriggers.
- Level crane in all directions.
- Get tires off the ground.
- Make sure you have adequate line when 2 parting, etc.
- MSDS sheets for chemicals located inside of crane.
- Fire extinguisher - monthly check.
- Make sure that all exposed moving parts such as gears, pulleys, belts, chains, shafts, flywheel, etc., are guarded or fenced.
- Check that all exhaust pipes are insulated in areas where contact by team members is possible in the performance of normal duties.
- Adequate lighting.
- Good window and windshield wipers.
- Keep load line vertical.
- Check for proper drum spooling.
- Make necessary weight deductions, block, rigging, etc. - always check load charts.
- Allow for high wind - reduce rating.
- Do not run out of rope. Have a minimum of three wraps on the drum or more if the crane manufacturer requires a higher minimum number of wraps.
- Do not two-block. Anti-two-block devices are optional on friction cranes except for hoisting personnel.
- Barricade the swing radius with warning lines or barriers.
- Insist on proper hand signals.

- Do not leave cab with load on crane or when crane is running.
- Start and stop and swing slowly.
- Check brakes when load is first lifted.
- Watch out for poor rigging.
- Watch out for stragglers.
- Check all latches.
- Keep alert.
- Know the plan.
- Boot power lines as an extra precaution.
- Operator nametag is on crane, boom truck, etc.
- Durable load chart is in crane and has clear legible letters and figures.
- Use sorting hooks (pelican hooks) for sorting only. (Never use pelican hook when raising load over any personnel or anything other than what it is intended for.
- Tag lines (6"x ½ inch diameter. minimum).
- Before leaving the crane unattended lower the boom to an intermediate angle with the block tied back. At this point the crane should be balanced.

Hazards in Dismantling or Shortening Booms:

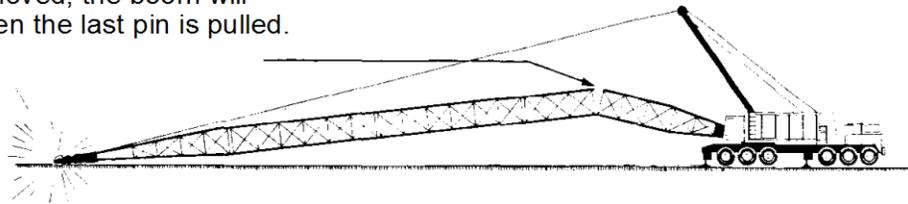
Many operators and riggers have been killed when dismantling or shortening booms and the main cause is usually failure to follow the procedures specified by the manufacturer. Work on the jobs involves the same hazards.

Never touch any (top or bottom) pin on any boom section located between the pendant attachment points and the crane



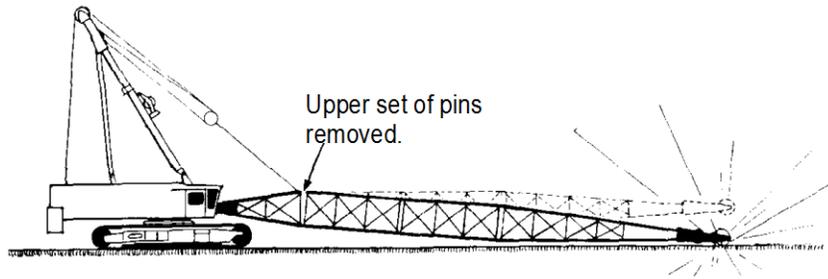
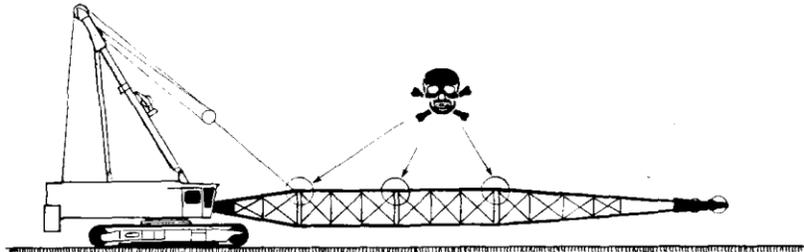
If a set of lower pins (located between the pendant attachment points and the crane) is removed the boom will jackknife down when the last pin is pulled.

If a set of top pins (located between the pendant attachment points and the crane) is removed, the boom will jackknife when the last pin is pulled.

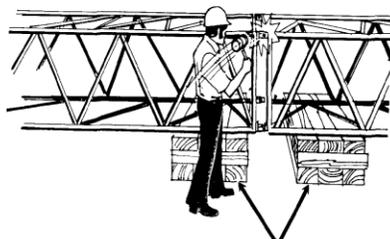
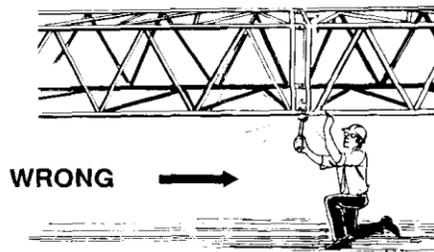


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Until the boom is solidly supported on its blocking, never touch the top pins ahead of the pendants. The boom will drop.



Caution: Never walk, work, lean or place any part of your body under the boom when it is being assembled, dismantled, shortened or lengthened. If necessary, use a long bar to knock the far side pins out.



Blocking under joint at both sides.

STAY OUT FROM UNDER THE BOOM
OUTSIDE =SAFE SIDE
INSIDE =SUICIDE

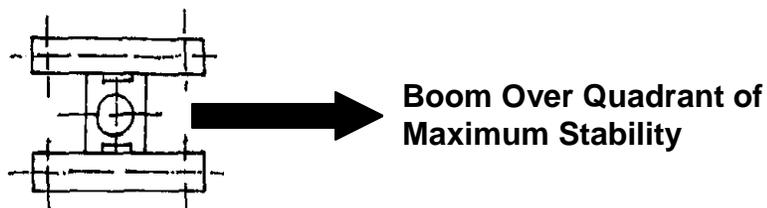
ASSEMBLY OF SHORT LATTICE BOOMS:

Caution:

- | | |
|--|--|
| <p>1. This assembly method applies only when the “maximum cantilever length” specified by the manufacturer is not exceeded. See page 6 for the procedure to follow if the boom is longer than the “maximum cantilever length”.</p> | <p>2. Be sure that the boom hoist pawl is always engaged except when lowering the boom. Don’t rely on the boom hoist brake alone to hold the boom. Wear, improper adjustment, water or oil on linings, and other factors may reduce the ability of the brake to hold the boom.</p> |
|--|--|

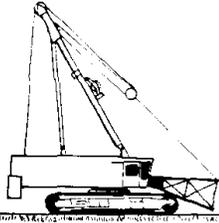
Check the manufacturer’s procedure and follow the instructions precisely. The following method is common to most manufacturers for pinned boom connections but may not apply to all: check the crane’s manual before attempting this job.

1. If so equipped, extend all outrigger beams fully and extend outrigger cylinders until wheels are clear of ground.
2. Level the carrier.
3. Check the amount of counterweight required in the load chart for the lifts to be made and the length of the boom being installed. Check also to ensure that enough counterweight is installed to lift the boom off the ground.
4. Check to see if the front bumper counter-weight is required.
5. If so equipped, the extendible counter-weight must be extended.
6. Rotate the upper-works to face “over the rear” or in the direction of maximum stability.

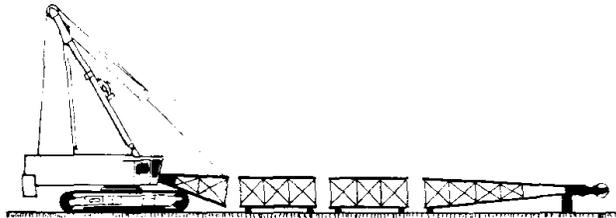


7. Set the swing lock.
8. Fully extend the gantry. If the machine has a live mast, check the load chart to see if it must be used.

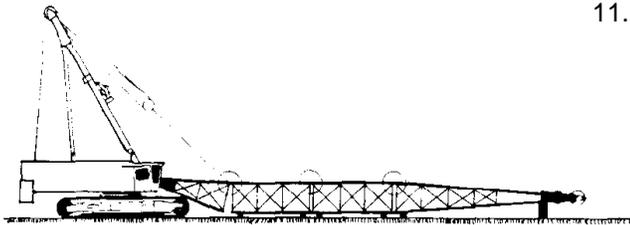
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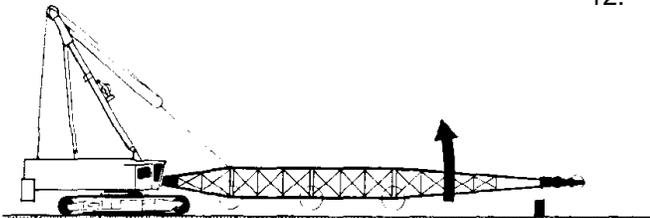
9. Install the heel or foot section of the boom and attach the pendants to the ends.



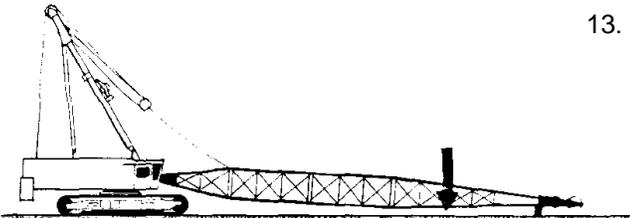
10. Lay out the boom inserts in the correct order specified by the manual. (Unless otherwise specified by the manufacturer, assemble the boom with the short insert sections close to the boom foot.)



11. Draw all of the sections together. Line up the upper pin connection points. Insert the top pins only and install the cotter pins.

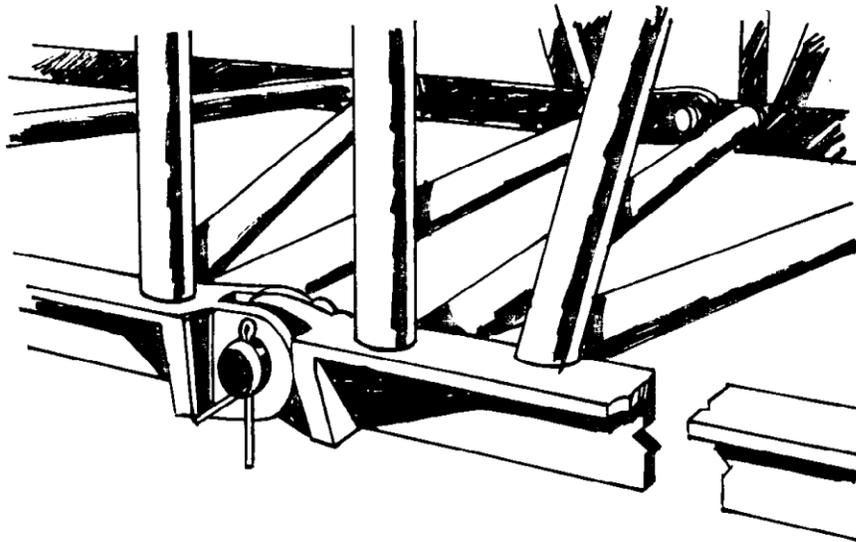
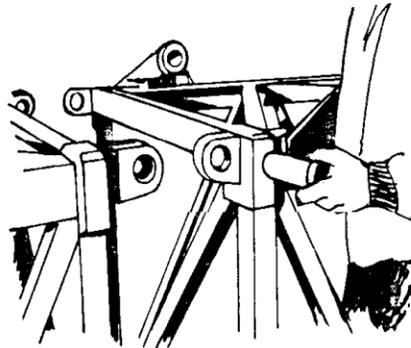
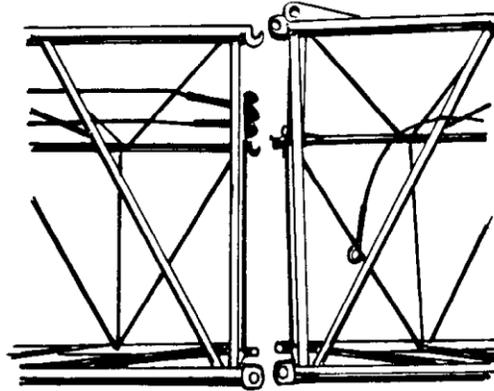


12. Boom up slightly until the bottom pin connection points line up. Engage the boom hoist pawl. Install the pins and cotters.



13. Lower the boom onto blocking until the pendants are slack.

MACHINE ASSEMBLY AND SET-UP:



THE BOOM SECTIONS MUST GO TOGETHER EASILY AND WITHOUT THE NECESSITY OF FORCING IN THE PINS.

Table A

REQUIRED CLEARANCE FOR NORMAL VOLTAGE IN OPERATION NEAR HIGH VOLTAGE POWER LINES 1926.1408 THE LINE'S VOLTAGE MUST BE DETERMINED (iii) OPTION (3)AND OPERATION IN TRANSIT WITH NO LOAD AND BOOM OR MAST LOWERED

NORMAL VOLTAGE, kV (PHASE TO PHASE)	"PROHIBITED ZONE" MINIMUM REQUIRED CLEARANCE, FT (M) Note (1)
Operation Near High Voltage, kV	
to 50	10 (3.05)
Over 50 to 200	15 (4.60)
Over 200 to 350	20 (6.10)
Over 350 to 500	25 (7.62)
Over 500 to 750	35 (10.67)
Over 750 to 1000	45 (13.72)
Over 1000	(As established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Operations in Transit With No Load and Boom or Mast Lowered

to 0.75	4 (1.22)
Over 0.75 to 50	6 (1.83)
Over 50 to 345	10 (3.05)
Over 345 to 750	16 (4.87)
Over 750 to 1000	20 (6.10)

Note:

(1) Environmental conditions such as fog, smoke, or precipitation may require increased clearances.

(From OSHA Small Entity Compliance Guide)

Danger – High Voltage: Electrocutions caused by a crane, load, or load line contacting a power line have caused numerous fatalities. To prevent such accidents in the future, the standard contains detailed, systematic procedures that employers must follow when operating cranes near power lines. These procedures are designed to 1) prevent equipment from making electrical contact with power lines; and 2) protect workers in the event that such contact occurs.

Note: Special rules apply to work covered by 29 CFR, Subpart V, Power Transmission and Distribution. This Guide does not cover Subpart V work.

The First Step – Could the crane get closer than 20 Feet to a power line? Keeping a safe distance from power lines is the key to preventing power line accidents. Therefore, the first step you must take when planning to operate a crane on a site where a power line is present is to identify the crane's work zone and use that work zone to determine how close it could come to the power line. If you determine that no part of the crane, load, or load line could get closer than 20 feet to a power line, no further precautions are required. If the initial plan for the crane's use changes during the project, you must reevaluate whether the equipment could get closer than 20 feet to the power line. [Note: If the line's voltage is over 350,000 volts, a 50-foot, rather than 20-foot, minimum clearance must be maintained. This Guide assumes that the voltage is less than 350,000 volts and uses the 20-foot clearance distance.]

There are two ways to identify the work zone and use it to determine whether the equipment could get closer than 20 feet to the power line. First, if the equipment (crane, load, load line, or rigging) could not get closer than 20 feet to the line even if the crane is operated at its maximum working radius, the 20-foot requirement is satisfied. Alternatively, you may establish a work zone by establishing boundaries (using flags or a device such as a range limit device or range control warning device) that are more than 20 feet from the power line and prohibiting the operator from operating the equipment past those boundaries.

Alternative to 20 Foot Clearance (Table A): If you know the line's voltage, you may use the minimum clearance distance in Table A in lieu of 20 feet. Table A provides:

Table A - Minimum Clearance Distances	
Voltage (nominal, kV, alternating current)	Minimum clearance distance (feet)
up to 50	10
over 50 to 200	15
over 200 to 350	20
over 350 to 500	25
over 500 to 750	35
over 750 to 1,000	45
over 1,000	(as established by the utility owner/ operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)
Note: The value that follows "to" is up to and includes that value. For example, over 50 to 200 means up to and including 200kV.	

One way to determine the line's voltage is to ask the line's owner or operator. The utility must respond to such a voltage inquiry within two working days.

Continued

If you use Table A to determine the minimum clearance distance, you must determine whether any part of the crane, load, or load line could get closer than the Table A distance to a power line if the equipment is operated up to its maximum working radius in the work zone.

If you determine that part of the crane, load, or load line could come closer to the power line than the required minimum clearance distance (either 20 feet or the Table A clearance), you must either de-energize and ground the line or take specified steps to maintain the required minimum clearance distance. These options will now be discussed.

De-energize and ground: De-energizing and visibly grounding the line will protect against electrocution and avoid the need for additional precautions. However, the employer must rely on the power line's owner or operator to take these steps, and utilities are generally unwilling to de-energize their lines because doing so will cut off service to their customers. As a result, this precaution will usually not be available. You must assume that all power lines are energized unless the utility owner/operator confirms that the power line has been and continues to be de-energized and the line is visibly grounded at the worksite.

Steps you must take to maintain the required minimum clearance distance: You must take **all of** the following steps.

- Conduct an activity planning meeting with the crane operator and the other workers who will be in the area of the equipment or load to review the location of the power line(s), and the steps that will be implemented to prevent encroachment/electrocution.
- If tag lines are used, they must be non-conductive.
- Erect and maintain an elevated warning line, barricade, or line of signs equipped with flags or similar high-visibility markings at the minimum clearance distance. If the operator cannot see the elevated warning line, a dedicated spotter must be used to signal the operator that the crane is passing the marked line.

In addition, you must use at least one of the following precautions:

- A dedicated spotter (a worker whose only duty is to observe the clearance between the equipment and the line) who is in continuous contact with the operator.
- A proximity alarm set to give the operator sufficient warning to prevent encroachment.
- A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device must be set to give the operator sufficient warning to prevent encroachment.
- A device that automatically limits the crane's range of movement, set to prevent encroachment.
- An insulating link/device installed between the end of the load line and the load.

If you use a dedicated spotter, the dedicated spotter must be able to judge the distance between the equipment and the line and inform the operator if the equipment is getting too close to the line. Therefore, the spotter must:

- Be equipped with a visual aid (such as a clearly visible line painted on the ground or a clearly visible line of stanchions) to assist in identifying the minimum clearance distance.
- Be positioned to effectively gauge the clearance distance.
- Where necessary, use equipment that enables the spotter to communicate directly with the operator.

- Give timely information to the operator so that the required clearance distance can be maintained.
- Be trained to be able to perform his/her duties effectively.

Operation below power lines generally prohibited: No part of the equipment, load line, or load (including rigging and lifting accessories) is allowed below a power line unless:

- The employer has confirmed that the utility owner/operator has de-energized and visibly grounded the power line at the worksite, **or**
- The highest point of the equipment's boom, even if completely extended and vertical, will be more than the required minimum distance from the power line.

Team Member Training: If the equipment contacts a power line, death or injury may be avoided if the workers in and on the crane know and understand the steps they can take to protect themselves. In general, the crane operator and any other person on the crane will be safe as long as they remain on the crane. The greatest danger is faced by a person who simultaneously touches both the crane and the ground, but a person who is near, but not touching, the crane can also suffer electric shock. To ensure that employees have the information they need to protect themselves, you must train each operator and crew member assigned to work with the equipment on how to avoid electrocution in the event the equipment contacts a power line. Such training must include:

- Information regarding the danger of electrocution if a person simultaneously touches the equipment and the ground.
- The importance to the operator's safety of remaining inside the cab except where there is an imminent danger of fire, explosion, or other emergency that necessitates leaving the cab.
- The safest means of evacuating from equipment that may be energized.
- The danger of the potentially energized zone around the equipment (step potential).
- The need for crew in the area to avoid approaching or touching the equipment and the load.
- Safe clearance distance from power lines.
- The limitations of an insulating link/device, proximity alarm, and range control (and similar) device, if used.
- How to properly ground equipment and the limitations of grounding.

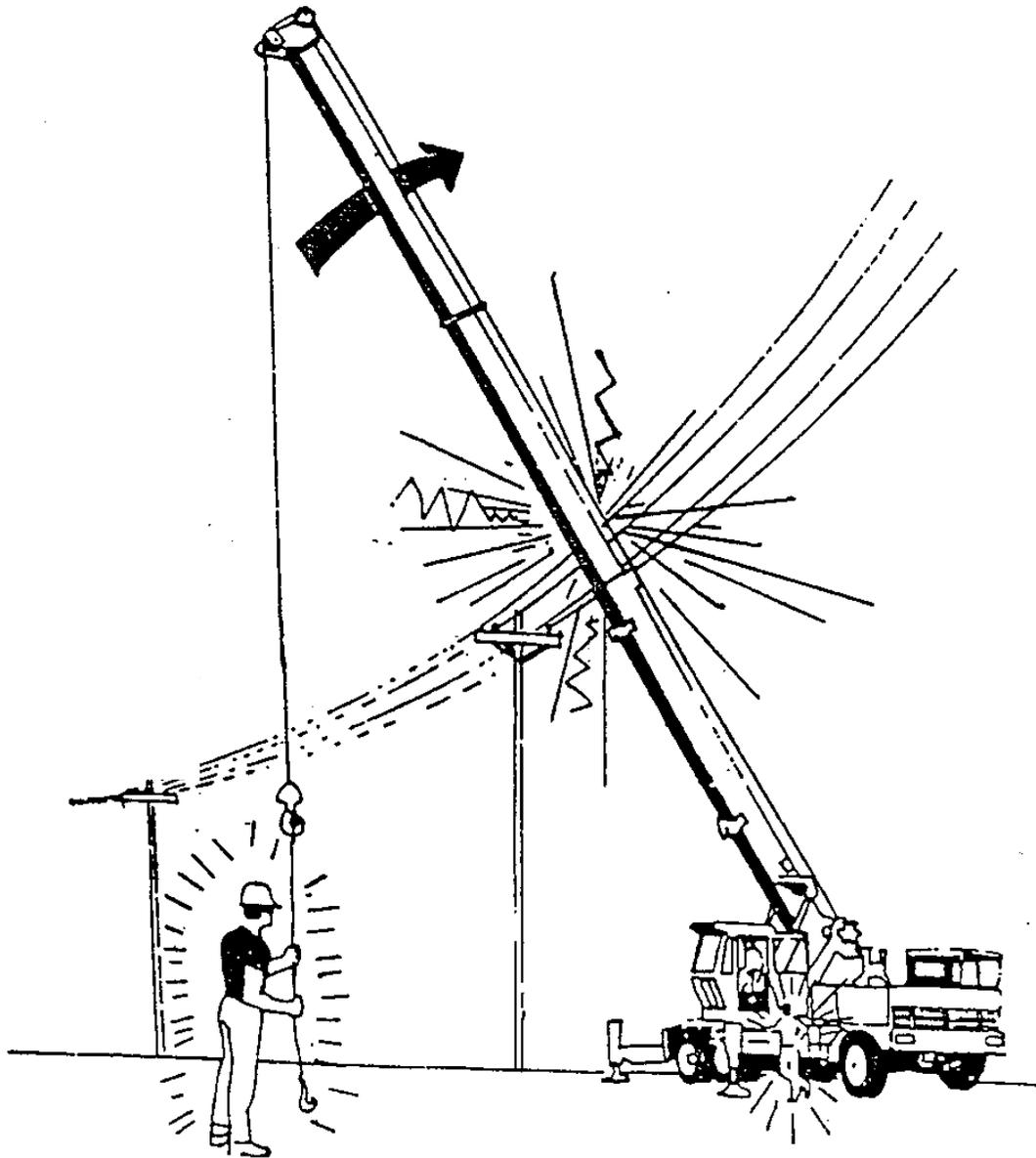
Assembling a crane near a power line: The precautions described above for crane operations must also be taken when assembling or disassembling a crane near a power line. Under no circumstances may a crane be assembled or disassembled beneath an energized power line.

Precautions for moving equipment: A crane traveling with a load must comply with the minimum phase to ground clearance distance and associated precautions listed above. If the crane is traveling with no load, the following clearance distances must be maintained.

Table T – Minimum Clearance Distances While Traveling With No Load	
Voltage (nominal, kV, alternating current)	While Traveling – Minimum clearance distance (feet)
up to 0.75	4
over .75 to 50	6
over 50 to 345	10
over 345 to 750	16
over 750 to 1,000	20
over 1,000	(as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution)

In determining whether the equipment will maintain the required clearance distance, you must take into account the effects of speed and terrain on the equipment's movement (including movement of the boom/mast). In addition, if any part of the equipment can get closer than 20 feet to the line, you must use a dedicated spotter to observe the clearance and signal the operator in order to keep the required minimum clearance.

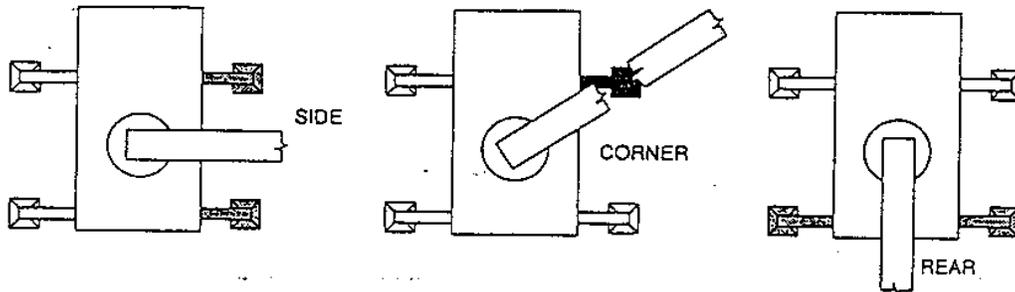
Power line contact is the largest single cause of fatalities associated with cranes.



MOBILE CRANES

Bearing Surface — Outrigger Blocking

Bearing Surface



Crane to Ground Pressure Points (Outriggers)

*Lifting a load over the corner produces the maximum ground bearing pressure. This is the most dangerous position to make a lift.**

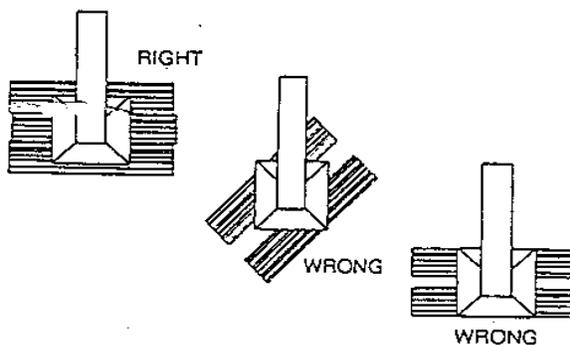
Take into account any dynamic or impact loads. Rapid swinging of the machine or suddenly stopping the load will greatly increase the ground pressure.

The ground pressure on a truck crane can be higher than those of a crawler crane due to the smaller total bearing surface area of the pads. For this reason always make sure the ground under the outrigger is firm enough to support the machine in a fully loaded condition.

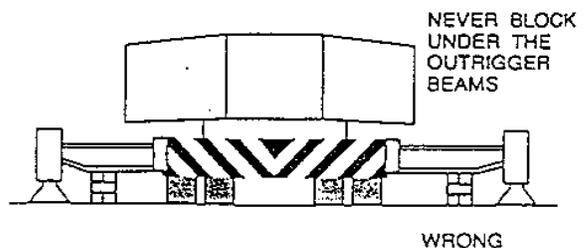
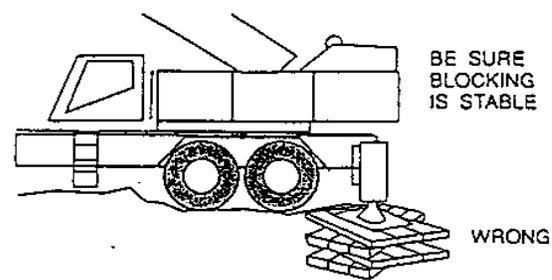
*Example - A 30 to 50 ton rough terrain or truck crane picking over the corner with a capacity pick can exert 120,000 to 200,000 pounds of down pressure on one outrigger. Be sure to provide for adequate support of all outriggers.

Outrigger Blocking

Any blocking under the outrigger float should be at least three times larger in area than the float, it should be rigid and completely support the total area.

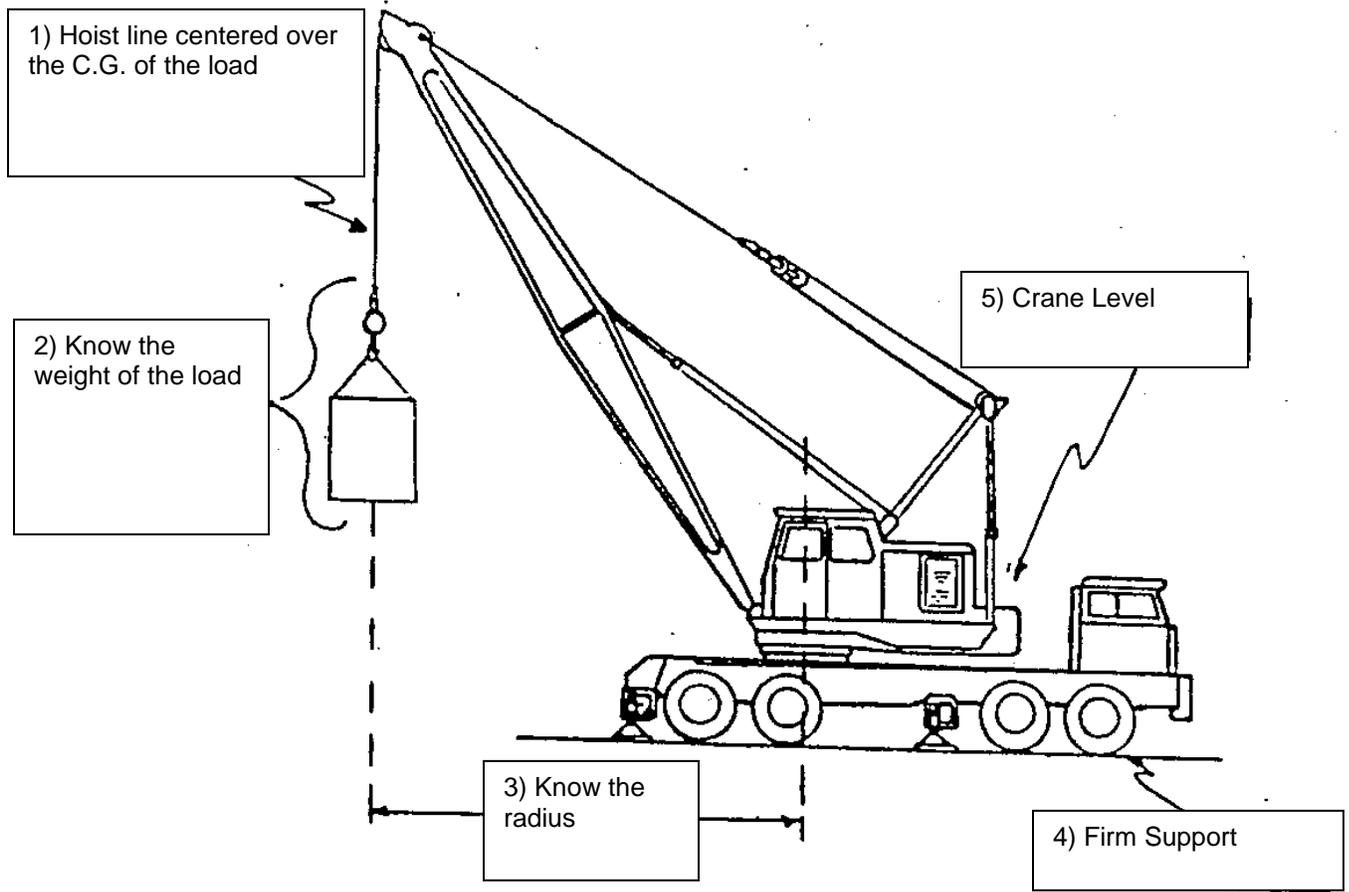


Right and Wrong Outrigger Blocking



Incorrect Blocking

Note: Always have firm compacted earth even when using outrigger blocking



Tagline Use Guideline

WHY DO WE USE TAGLINES? TO HELP CONTROL LOADS/MATERIALS SUCH AS:

- Controlling loads in windy conditions
- To keep long materials from swinging into the crane booms
- To keep loads/materials from swinging into power lines
- Maneuvering loads through or around tight spaces
- Anytime when working around traffic and pedestrians
- When performing steel erection
- When hoisting close to or onto scaffolds
- When hoisting suspended personnel platforms, if appropriate
- When a rotation of the load would be hazardous
- When working on any site when MSHA rules apply (tag lines on all loads)

TYPES OF MATERIALS USED AS TAGLINES:

- Nonconductive line: **dry polypropylene rope only** (when used around power lines)
- **Do not use electrical extension cords, wire, air hoses or lanyards used for fall protection**
- No loops, hooks or knots on the ends of taglines (they tend to catch on items)

LENGTH OF TAGLINES:

- Short enough so as not to get tangled on items being lifted over
- Long enough to handle bulky/long loads from the ground (100% control)
- Long enough to control a load when landing

SECURING TO LOADS:

- Use knots that can be easily untied
- Can use snap hooks on end of tagline to secure to load
- Tie to bolt holes in steel, to rigging on loads, or wrap around the loads

HANDLING TAGLINES:

- Do not wrap the tagline around your hands, arms or body (You may find yourself going up with the load. For the reason, you cannot unwrap the line as fast as the load was being lifted.)
- May need 2- taglines to control the load
Example: Have a tagline on each end of a girder where one team member would be pulling in one direction and the second team member would guide the load in a different direction
- May need to wrap a tagline around a fixed object to control or secure the line

STORING TAGLINES:

- Coiled up in rigging storage area
- Inside compartments of cranes, boom trucks and other lifting equipment
- Send taglines with rigging
- Store & inspect taglines as part of your rigging

The following are examples of load measuring devices:

LLX Range with Microprocessor

- new design with new technology
- 9 models: 250 kg to 100 ton
- up to 250 hours operation
- push-button controls
- 100% tare
- peak hold
- automatic shutdown
- numerous other important features and improvements



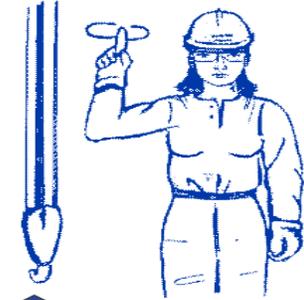
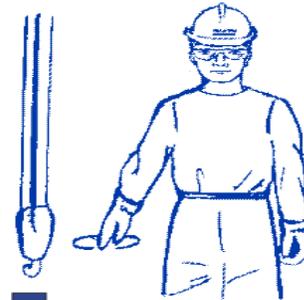
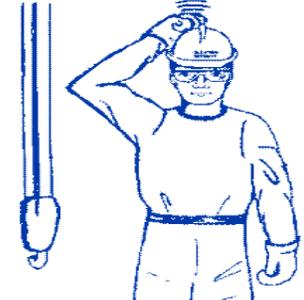
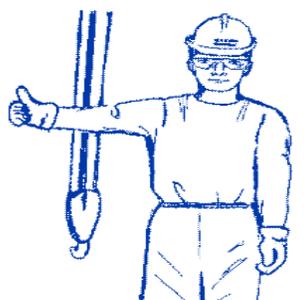
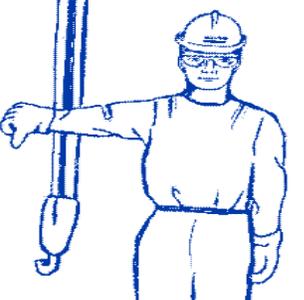
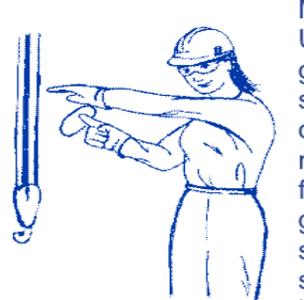
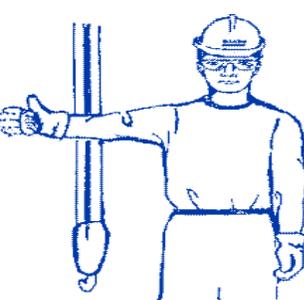
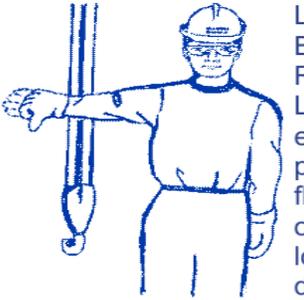
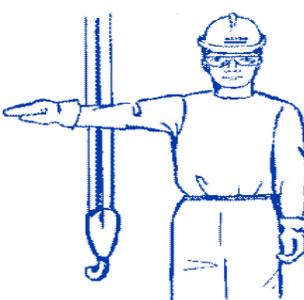
Dynafor MWX range

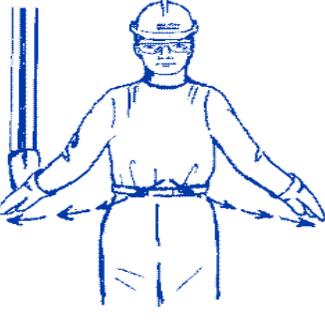
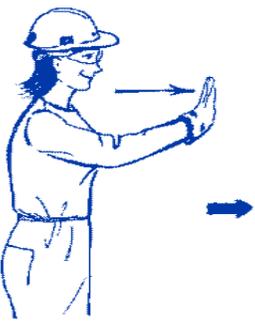
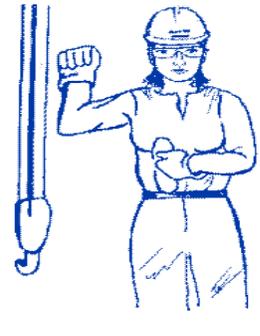
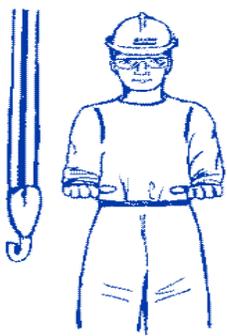
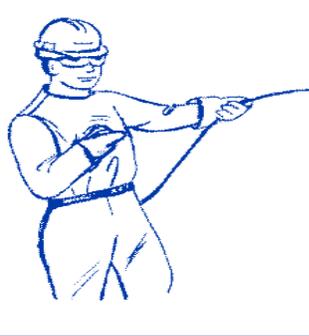
With its top eye and large bottom hook, the DYNAFOR MWX range is designed for check weighing and load measuring applications on overhead cranes. They use the same electronics as the LLX range. The DYNAFOR MWX models have a battery life of up to 700 hours.

Options:

- Model (MWX-IR) with infrared controls available on 2.5t, 5t, and 12.5t capacities, (ON/Off, tare, peak hold)
- Hand held display, with controls (ON/OFF, tare, peak hold)
- LED display available on 2.5t, 5t, and 12.5t capacities



	<p>HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.</p>		<p>LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.</p>
	<p>USE MAIN HOIST. Tap fist on head; then use regular signals.</p>		<p>USE WHIP LINE. (Auxiliary Hoist) Tap elbow with one hand; then use regular signals.</p>
	<p>RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.</p>		<p>LOWER BOOM. Arm extended, fingers closed, thumb pointing downward</p>
	<p>MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly as shown in example)</p>		<p>RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.</p>
	<p>LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.</p>		<p>SWING. Arm extended, point with finger in direction of swing of boom.</p>

	<p>STOP. Arm extended, palm down, move arm back and forth horizontally.</p>
	<p>EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.</p>
	<p>TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.</p>
	<p>DOG EVERYTHING. Clasp hands in front of body.</p>
	<p>TRAVEL. (Both Tracks) Use both fists, in front of body, making a circular motion, about each other, indicating direction of travel; forward or backward. (For crawler cranes only)</p>
	<p>TRAVEL. (One Track) Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. (For crawler cranes only)</p>
	<p>EXTENDED BOOM. (Telescoping Booms) Both fists in front of body with thumbs pointing outward.</p>
	<p>RETRACT BOOM. (Telescoping Booms) Both fists in front of body with thumbs pointing toward each other.</p>
	<p>EXTENDED BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest with thumb tapping chest.</p>
	<p>RETRACT BOOM. (Telescoping Boom) One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.</p>

Policy Number: 029

Authorized By: Michael W. Bennett

Title: Safe Handling and Storage of Compressed Gas

Effective Date: 04/01/94

Page 1 of 7

1 Status

1.1 Update of existing policy, effective 03/05/15.

2 Purpose

2.1 To protect team members and the public from the hazards of storing and using compressed gas.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 HMIS: Hazardous Materials Identification System.

4.2 NFPA: National Fire Protection Association.

4.3 The abbreviation "MT" refers to "empty."

5 Policy

5.1 All team members and subcontractors working for Cianbro will follow the procedures outlined in this written policy.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 The corporate safety department is responsible for maintaining this document.

7 Safe Handling and Storage of Compressed Gas Index

7.1	Transporting, Moving, And Storing Compressed Gas Cylinders:	2
7.2	Training And Set-Up.....	4
7.3	Reverse Flow, Back Fires And Flashbacks.....	5
7.4	Dangers Of Oxygen.....	5
7.5	Rosebuds	5
7.6	Dangers Of Acetylene	6
9.1	Appendix A Flashback	7

7.1 Transporting, Moving, and Storing compressed gas cylinders:

Always use proper methods for transporting or lifting compressed gas cylinders. Use single or double bottle carts when applicable. When using equipment to carry or lift cylinders make sure they are securely fastened into a rack that is properly designed and built to accommodate the task you are planning.

- Each project is responsible to check our bottle racks that will be lifted by crane or forklift to make sure that they are load rated as stated in 1926.251 (a)(4). If the racks have not been rated we need to do a visual inspection and a dynamic load test for 125% of the rated load capacity and if they pass we can mark those 100% of the loaded capacity. You will need to document and put the capacity on the rack.
- The documentation will have the date tested, the racks small tool number, the weight applied and the new rating. A copy of the test will be sent to the small tool group and a copy kept on site. When you ship the rack off of the project the documentation needs to go with the rack.
- All racks coming through the shop in Pittsfield will be engineered and the weights will be welded to the rack. Even if the racks are done on a project they will be retested in the shop and the dry weight of the rack and the safe allowable load will be labeled on the rack.

7.1.1 Never lift or transport cylinders with gauges or torch set-ups still in place. Always disconnect torches and make sure all safety caps are installed properly.

7.1.2 Never use valve protection caps for lifting cylinders from one vertical position to another. Bars shall not be used to pry caps loose when frozen. If a cap cannot be removed by hand, either use a tool specifically designed for removing caps or tag the cylinder "Do Not Use" and return it to the vendor. Never use a tool that is not designed for removing caps.

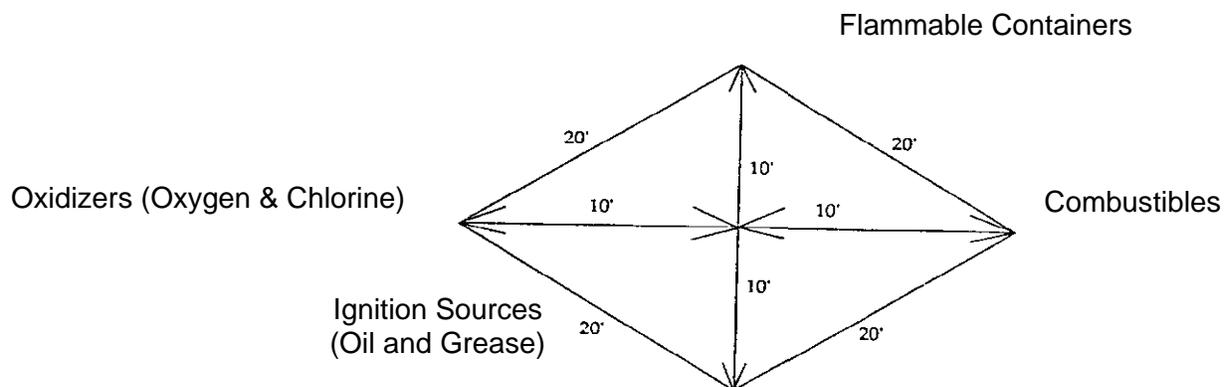
7.1.3 When cylinders are transported by forklift, pickup or any other vehicle they must be secured in a vertical position. Compressed gas cylinders are very heavy and should be handled with every mechanical advantage available such as single bottle carts for changing "empties", lift gates on trucks or approved hoisting racks to prevent strains/injuries.

7.1.4 Unless cylinders are firmly secured on a bottle cart designed for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved from one area to another.

7.1.5 Some federal, state and local firms or agencies have governing limitations on the amount of a particular compressed gas that can be transported over the road. These agencies also control the proper licensing and permitting required to transport. Due to the changing situations from state to state you should contact Corporate Safety before moving cylinders over the road. In all cases, you need a completed bill of lading.

7.1.6 Compressed gas cylinders must be secured in an upright position at all times by bottle carts, chains, or other sturdy non-combustible hold down devices to prevent bottles from being knocked over while in use or in storage. Valves shall be closed at all times except when cylinders are in use. This includes whenever the bottles are unattended.

- 7.1.7 When designing and fabricating gas storage racks on jobsites give particular thought to making these racks ergonomically correct. Platform height from the ground and accessibility and operation of doors are important items to remember for team member daily usage and scheduled delivery personnel.
- 7.1.8 Be sure that storage racks are clearly and correctly marked and labeled. Design and implement some kind of marking or labeling system for full or empty cylinders. Example: Mark them "MT" or similar.
- 7.1.9 Cylinders shall be kept far enough away from actual welding or cutting operations so that sparks, hot slag or open flames will not reach them. When this is impractical, a fire resistant shield shall be provided. Oxygen must be separated from fuel gas by a minimum of 20' or have a ½ hour fire barrier of at least five feet in height plus be kept 50' from any combustibles or flammable materials. (See sketch as a good rule of thumb for storage of cylinders). Please note that cylinders in a bottle cart but not in use are considered in storage and therefore a citable violation unless there is a fire barrier between them. The material used for a fire barrier according to NFPA must provide a 30-minute fire barrier. A suggested fire barrier would be 1/8" minimum carbon steel plate.



- 7.1.10 Cylinders must be stored in well ventilated areas.
- 7.1.11 In HMIS (preferred) or NFPA label should be on all cylinders or at the wall of the storage area above the cylinders (e.g. acetylene storage area marked with appropriate HMIS or NFPA label for acetylene). Also, all cylinders must have a DOT label attached. All cylinders on site must be clearly marked for contents.
- 7.1.12 Securing cylinders with materials such as rope or duct tape is not an allowable practice. Materials such as chain or other fire resistant material should be used in an appropriate manner.
- 7.1.13 Cylinders shall be placed where they cannot become part of an electrical circuit such as electrode arc strikes or near open flames, hot metal, or other external heat sources. Ambient temperatures should not be allowed to rise beyond 130°F maximum. Note: Special care should be taken to ensure that arc strikes do not occur when power cable connections for the tig torch are located near argon cylinders.
- 7.1.14 Cylinders containing oxygen or acetylene or other fuel gases shall not be taken inside of confined spaces.
- 7.1.15 Treatment of cylinders – Cylinders, whether full or empty, shall not be used as rollers, supports or other than the original intent.
- 7.1.16 Torch set ups need to be broken down at the end of each shift. Bottle caps must be secured to prevent damage to the valves of the bottles.

7.2 Training and Set-Up

- 7.2.1 All team members must be trained in the safe use, handling, and storage of gas cylinders.
- 7.2.2 Inspect all gas cylinders, hoses, regulators, and other accessories before using. Do not use if defective.
- 7.2.3 Before a regulator is connected to a cylinder the valve should be cracked slightly and shut back off immediately (except hydrogen). Use the tool provided by the gas supplier if needed. This will blow out any dirt or debris that has settled within the valve that might otherwise enter the regulator. The person cracking the cylinder valve should stand to one side of the outlet and make sure that the blast of gas is not directed towards team member work areas, open flames or other possible sources of ignition.
- 7.2.4 Before opening the cylinder valve, make sure the adjusting screw on the regulator has been backed all the way off. This prevents damage to the outlet pressure gauge and premature purging of the gas lines. Please refer to the manufacturer's recommended pressure settings.
- 7.2.5 Leak Testing Connections: Check for gas leaks at the fittings every time equipment is set up. Apply leak test or "Snoop" non-petroleum based soapy water to valves, joints, connections, and around the regulator gauges. If bubbles appear a leak is present. **Never** use an open flame to test for leaks. Depressurize the hose, regulator, or torch if a leak is found. If the leak is at a threaded connection, open the connection and wipe the sealing surfaces with a clean, dry cloth. Check threads to make sure they are clean and that they are not stripped or bent. Damaged fittings should be replaced. Tighten the connection and re-pressurize the system. Test again for leaks. If they are found, depressurize the system again and add a tag marked "Danger Do Not Use" and return the equipment for repair. If the leak is at the junction of the cylinder valve and cylinder, do not try to repair it. Move the bottle to an outside location away from ignition sources and contact the supplier for further instructions.
- 7.2.6 Oxygen cylinders contain 2,000 PSI or more. Always open cylinder valves slowly!
- 7.2.7 If pressure hits the regulator all at once, it can mean hundreds of degrees of temperature rise and severe shock to the regulator. Under the right circumstances this could cause ignition of the regulator seat. Remember that what can hurt your equipment can hurt you! Always turn oxygen valves to the full open or closed, intermediate positions could leak. Once the valve has been fully opened adjust regulator to desired pressure and purge the oxygen line. Never use oil/grease or petroleum based lubricant on any threaded connection or parts.
- 7.2.8 Acetylene is stored in specially constructed cylinders that contain a porous filler material. The porous mass is wetted with acetone in which the acetylene is dissolved. The combination of porous filler and acetone allows the acetylene to be safely contained in the cylinder at 250 PSI. Never use an acetylene cylinder on its side due to the liquid acetone being allowed to flow into the regulator and hoses. Once the acetylene is released as a gas from the cylinder, the working pressure at the discharge side of the regulator should never exceed 15 PSI. Acetylene becomes dangerously unstable at 15 PSI and above. It is recommended that the cylinder valve be opened no more than $\frac{1}{4}$ to 1 full turn. Many acetylene cylinders have a hand-wheel valve but for those requiring a tank wrench, the wrench must be left in place while in use so that the valve may be closed quickly in the event of an emergency.
- 7.2.9 The use of propylene as the cutting gas instead of acetylene is recommended:
- A 63 lb bottle of propylene will last as long as five # 4 (81 lb) bottles of acetylene.
 - Reduce chances of back injuries by changing bottles less frequently.
 - Propylene is 20 times more stable according to the gas industry and there is a lower tendency for flashback than acetylene.
 - Cylinders are lighter to the same comparable size acetylene bottle.

- 7.2.10 Always use flint/spark strikers to light a torch. Never use matches, cigarette lighters or hot metal.
- 7.2.11 Clean tips with proper tool and only when torch set is shut off.
- 7.2.12 Never use the torch as a hammer or pry bar.
- 7.2.13 Anyone using a torch set should be adequately trained in its safe use by a qualified, knowledgeable trainer.

Note: Plastic lighters shall never be stored in your pocket while doing hot work. Slag can penetrate the lighter causing an explosion and serious injury.

7.3 Reverse Flow, Back Fires and Flashbacks

- 7.3.1 Reverse flow of acetylene or fuel gas may occur when the oxygen cylinder is low or empty. Fuel gas at a higher pressure than the oxygen can travel up the oxygen line to mix with gas in the hose, regulator and possibly the cylinder. Lighting the torch without purging the hoses can result in a rapid burn-back, possibly causing an explosion in the torch, hose and regulator. (See 9.1 Appendix A).
- 7.3.2 Although OSHA has not set specific standards on the type and location of combination reverse flow/flash arrestors concerning single bottle installation, Cianbro and our suppliers agree that the following configuration offers the safest means of protection.
 - Install reverse flow check valves at the regulator. Ensure arrow on check valve is pointed in the proper direction for correct flow. Note: Carefully follow the manufacturer's specific instructions for installation, maintenance and inspection.
 - Combination reverse flow/flash back arrestor. Check reverse flow part of valve every six months. Change the flashback arrestors annually.
 - Victor torches have flashback arrestors built in.
 - When they are sent back to Supply they are sent out to be inspected.

7.4 Dangers of Oxygen

- 7.4.1 Oxygen is a colorless, odorless and tasteless gas. It makes up about 21 percent of our atmosphere.
- 7.4.2 Reduce oxygen levels to 15 percent and a candle won't burn. Increase oxygen content to 25 percent and cotton thread burns eight times faster than normal.
- 7.4.3 When using oxyfuel torch and hoses, much of the oxygen goes straight through the cut and enriches the surrounding air. Cutting in confined spaces, therefore, requires ventilation not only to remove fumes but also to remove excess oxygen.
- 7.4.4 Another danger of oxygen is related to its action in the presence of oil or grease. Together oxygen and hydrocarbons may react violently. This effect is particularly dangerous when it occurs in the confined space of a regulator body when a cylinder valve is opened. Never store oxygen regulators or accessories in the presence of oil, grease or petroleum-based lubricants and always bag, place in plastic containers with lids (i.e. Rubber maid) or cap ends of gauges and other oxygen accessories when not mounted on cylinders.

7.5 Rosebuds

- 7.5.1 It is not recommended to use flashback arrestors on rosebud operations, because of flow restrictions on acetylene tanks.
- 7.5.2 Anyone using a rosebud should be adequately trained in its safe use by a qualified, knowledgeable trainer.

7.6 Dangers of Acetylene

- 7.6.1 Acetylene is very flammable and explosive and must be handled with respect.
- 7.6.2 At pressures above 15 PSI, acetylene is very unstable and can explode without a source for ignition.
- 7.6.3 All flashbacks have the potential to create a bottle explosion and must be prevented with the proper training and protective equipment. (See 9.1 Appendix A).
- 7.6.4 Reverse flow can occur when the oxygen cylinder is low or empty.
- 7.6.5 OSHA reports its regulations for using gas regulators and cylinders are among the 25 most frequently cited rules in the industry. This safety policy and procedure provides suggested information for safe storage and handling. Activity planning and thorough training are the keys to keeping our jobsites safe. For more information, contact Corporate Safety.

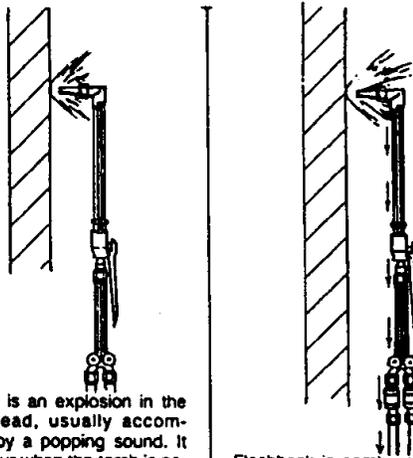
8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all PPE requirements under this policy and to provide necessary training.

9 Related Documents

- 9.1 See attachment.

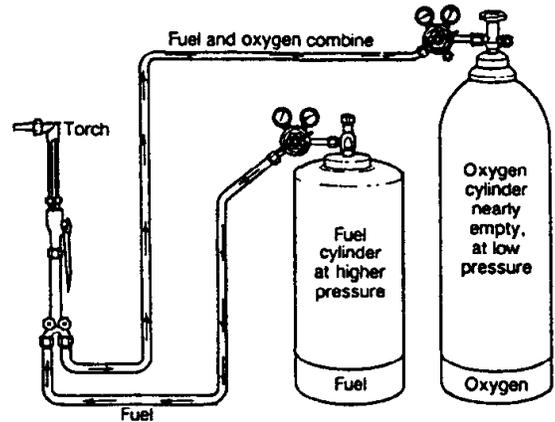
BACKFIRES AND FLASHBACKS



Backfire is an explosion in the torch head, usually accompanied by a popping sound. It may occur when the torch is positioned too close to the work. Loose connections, leaking hoses, incorrect gas pressures, or anything that causes gas starvation at the tip may cause a backfire.

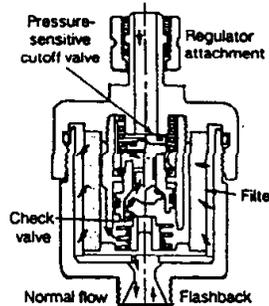
Flashback is combustion in the torch head, usually accompanied by a whistle sound. It can burn back through hoses to the gas cylinders. If this occurs, close the oxygen valve immediately.

HOW REVERSE FLOW OCCURS



With the oxygen cylinder nearly empty and the fuel cylinder at higher pressure, when the operator opens the torch fuel valve and then the torch oxygen valve, fuel gas can flow into the oxygen line. Lighting the torch, the mixed gas can burn back to the oxygen cylinder. Check valves on the torch prevent reverse flow and forestall such accidents.

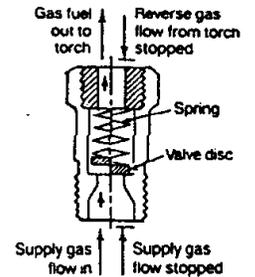
HOW FLASHBACK ARRESTERS AND REVERSE-FLOW CHECK VALVES WORK



Flashback arrester

In normal operation, left, gas flows through the open cut-off valves and check valve through the flame arrester filter into the hose.

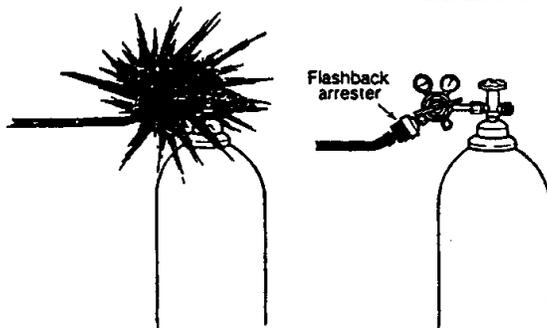
In the event of a flashback, right, the stainless steel filter stops the flame and the pressure wave activates the cut-off valve, stopping the flow of gas to extinguish the flame. The check valve operates when gas flows towards the cylinder. If the arrester is exposed to fire, the thermal cut-off valve shuts the gas supply. Reusable after a flashback.



Check valve

In normal operation, left, gas from the supply hose is at pressure higher than gases in the torch, so pressure in the hose lifts the valve disc against spring pressure and gas flows into the torch. If pressure inside the torch plus force of the spring on the disc exceed pressure in the supply hose, the disc seats and shuts off flow of gas from the torch into the hose. Not reusable after a flashback.

HOW FLASHBACK ARRESTERS STOP EXPLOSIONS



When flame flashes back through a hose to an unprotected regulator, fire can burn into the cylinder. Unless the operator can manage to close the cylinder valve, fire fed by the gas or an explosion is likely. A flashback arrester mounted on the regulator stops the flame as it enters the arrester and instantly shuts off supply of the gas, preventing fire or explosion.

Safety tips

DO NOT use oxygen for any purpose other than operating the torch.

DO NOT use acetylene at pressures over 15 lb/in.²

DO NOT use damaged equipment.

DO use only Underwriters-Laboratory(UL)-approved equipment.

DO fit check valves on both lines at the torch.

DO fit flashback arrestors at oxygen and fuel-gas regulators.

Policy Number: 030**Authorized By:** Michael W. Bennett**Title:** Placing Concrete**Effective Date:** 10/01/94Page 1 of 5

1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 To ensure the safety of the team when placing concrete and while working around the equipment used for placing and finishing concrete.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

3 Definitions

- 4.1 Bail: The section above the bucket that the rigging attaches to, usually on laydown buckets these move when lifted by the hoisting equipment to center the load beneath the hook.

4 Policy

- 5.1 When placing concrete, the requirements from this policy must be followed to plan and do the work.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of placing and finishing concrete under this policy.
- 6.2 The top Cianbro manager of the project site is responsible for implementation of this policy on the project.
- 6.3 Cianbro Corporate Safety is responsible to maintain this document.

7 Placing Concrete Index

7.1	Planning The Activity.....	2
7.2	Hazards On The Forms.....	2
7.3	Personal Protection	3
7.4	Pouring With Buckets.....	3
7.5	Using Other Equipment.....	4

7.1 Planning the Activity

7.1.1 Before concrete placement begins, a detailed activity plan must be developed and reviewed with the crew. This plan should deal with every aspect of the pour(s) from start to finish in order identifying all hazards and factors to complete the work. Some safety items to consider when planning a pour are:

- Access to the Pour
- Pour Staging and Travelways
- Fall Protection (6' or less)
- Eye Protection
- Hand Protection
- Crane Capacity and Reach
- Electrical Power Needs and Associated Problems
- Emergency Evacuation Procedures
- Tripping Hazards
- Concrete Burns to the Skin (Prevention & Treatment)
- Placement Location Confined Space Requirements
- Weather Conditions
- Hearing Protection

Remember, our goal is to identify and eliminate hazards before the work begins.

7.2 Hazards on the Forms

The placement crew will encounter all sorts of "temporary" dangers and hazards during the pour. Some things to be considered are:

7.2.1 Form Strength

- Ability to support both the dead weight of the concrete plus the live loads of deposited concrete and crew members up on form supported staging.
- Consult a qualified engineer to assist in formwork design.

7.2.2 Access to the Pour

- Ladders, gangplanks or stairways must be provided to get crews to and from the pour areas.
- For below grade pours, ramp ways for "slip-free" access can be built or excavated. Stairs can also be built.
- Ensure that there is adequate room to exit at the end of bridge decks or elevated slabs when the finishing machine approaches.

7.2.3 Pour Stagings and Walkways

- Sufficient travel ways must be provided for crews to access all areas being poured. This will eliminate injuries due to climbing around, losing grip, slipping, falling, etc.
- Remember to consult the Cianbro Scaffold Safety Policy and Procedure for more specific information on this.

7.2.4 Trip Hazards

- Must be eliminated at the pour level. This includes cords, tools; rebar projections, imbeds, form components and any other materials.

- 7.2.5 Fall Protection
 - Try to eliminate this hazard with staging, handrails, etc. If possible, try to eliminate the need for 100% tie off especially when pouring with crane and bucket.
- 7.2.6 Projections from Within the Form
 - Protruding rebar, form ties or even ledge conditions can present serious hazards.
 - Rebar caps shall be utilized where necessary and plywood shields shall be installed to guard against stabbing or impalement.
- 7.3 Personal Protection
 - 7.3.1 Provide a "Motor Person"
 - This person can carry the motor for the crew member performing the actual concrete vibrating.
 - Outfit the motor person with a shoulder strap to help support the motor and to give more freedom to his/her arms and hands.
 - 7.3.2 Rotate Jobs
 - Have the "motor person" and the vibrator person switch jobs periodically. By taking turns at the different tasks, repetitive motions that lead to injury will be minimized.
 - Rotate when raking, wheeling or shoveling concrete.
 - 7.3.3 Electric Power
 - Route cords away from travel ways and access ways. Be sure of the power source and use GFCI's.
 - Inspect all power cords for defects and tape plug connections to keep connections dry on wet days.
 - As always you need to lock out tag out when cleaning or working on the carriage of the machine so that pinch and crush points are eliminated.
 - 7.3.4 Correct Tool Selection
 - Choose the correct vibrator shaft length for the job. If the shaft and head assembly is far longer than required to reach, the work is much greater and the chance of injury and fatigue more likely.
 - 7.3.5 Protect Those Eyes
 - Concrete in the eye is a nasty situation and is very painful.
 - Double eye protection is required when vibrating concrete unless it is determined that no face/eye hazard exists and supervisory approval is received.
 - 7.3.6 Guard Against Concrete Burns to the Skin
 - Wear gloves to protect hands and fingers.
 - Wear high top rubber boots during slab pours to protect from concrete affecting ankles and lower leg areas. You need to keep your boots taped or closed at the top so that concrete does not go into boots and cause a rash from friction or burns on your legs. This will also protect leather boots which are adversely affected by the chemicals in concrete.
 - Wear face shield over safety glasses when chance of splatter exists.
 - Use barrier cream on exposed skin and always wash off concrete from skin as soon as possible.
- 7.4 Pouring with Buckets
 - 7.4.1 Bucket Condition
 - Inspect the bucket thoroughly for cracks, breaks or defects that would adversely affect its performance prior to every pour. Pay special attention to the "Bail", the part where the hoisting equipment attaches to the bucket. As you land the bucket, the bail will come down and you need to keep fingers, hands and other body parts clear so they will not get pinched.

- Never weld, drill or work on the bail in any way without the manufacturer's approval.
- Keep the bucket very clean inside and out so proper visual inspection can be made.

7.4.2 Bucket Rigging

- Inspect wire slings and shackles used in lifting the bucket prior to every pour.
- Make sure these components are sized properly for the weight of the bucket plus its contents.
- Wire the screw pin to the shackle body to keep it from "backing out".

7.4.3 Pinch Points

- Every moving bail should have "bail stops" to keep the bail from slamming down on top of the bucket if suddenly released.
- Evaluate your bucket and take additional measures to prevent injury from the bail if necessary. (i.e. screens, guards).
- Be careful of the bucket jaws. Keep hands and feet back from the pinch points.
- Have only one bucket person operating the handle to avoid confusion.

7.4.4 Overfilling

- Train the bucket tender and ready mix drivers to avoid overfilling the bucket causing spillage onto the bucket itself.
- Once in the air, this spillage can fall off and injure crew members or damage equipment.

7.4.5 Bucket Handling

- Double check with crane operator regarding crane capacity and reach.
- Train all bucket handlers in landing the bucket and working with the crane operators.
- Maintain eye contact with the operator and never get behind the bucket or out of site.
- Install handles on the bucket for tenders to guide it.
- Keep hands away from the bail and other pinch points.
- Have only one crane signal person to avoid confusion.

7.4.6 Watch Overhead

- Plan the crane swing route. Inform all crew members and have the crane operator sound the horn to notify crews that the bucket is being flown.
- Stay out from beneath the bucket until it is down close, then approach to handle it.
- Have an escape path planned and clear of obstructions and tripping hazards. The crew must be able to get clear of the bucket at all times.
- Maintain eye contact with the crane operator.

7.5 Using Other Equipment

7.5.1 When "Wheeling" Concrete

- Inflate tires to proper pressure.
- Don't overfill - avoid back strains, remember to lift with your legs.
- Provide ample travel ways with good footing, clutter free.

7.5.2 When Using Conveyors

- Barricade off around the machine to block thruways beneath belt area.
- Guard pinch points and moving parts.
- Use a "spotter" when moving the conveyor.
- Keep people away from the "drop chute" end.

- 7.5.3 When Working with Hoppers
 - Never handle hoppers and tremie tubes alone, get help.
 - Always be sure of the "hold" that is on a hopper and tremie before flying it overhead.
 - Securely fasten hopper and tubes together before flying overhead.
- 7.5.4 When Using Concrete Pumps
 - Inspect pump hoses and slick lines for condition. Look for weak spots that may "blow out".
 - Stay clear of the discharge end of the pump hose. (Especially during a plug).
 - Wear gloves to handle hoses.
 - Use hose "whip check" lanyards in case of a "blow apart".
 - Get help in lifting pump hoses and slick lines. Avoid back strains. If possible, use equipment to lift the hoses.
 - A rope attached to the pump hose will make positioning easier.
 - Never kink, fold or pinch a pump hose.
- 7.5.5 Bidwell or Deck Machines
 - When working on deck pours in front of the machine keep hands and feet away from the carriage with the augers and rollers.
 - If you have to adjust the augers or works on the carriage, when the operator stops the carriage disengage the hydraulics so augers or barrels can not turn.
 - Make sure that you keep hands, feet; tools, electric cords, and water hose off of the machine rail because the operator cannot see all areas around the machine and make sure that all guards are in place.
 - Operators must be aware of fall protection because of where the operator's seat is located.
- 7.5.6 Use this Safety Policy and Procedure in planning concrete pours and in training concrete placement crew members. Some other Safety Policy and Procedures to consult with would be:
 - Fall Protection Program
 - Confined Space Entry
 - Scaffold Safety
 - Crane Safety

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 Not applicable

Policy Number 031**Authorized By:** Michael W. Bennett**Title:** Personal Protective Equipment**Effective Date:** 12/01/94Page 1 of 8

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 To ensure that we put the proper thought (through a hazard analysis as part of the activity plan) into selecting the appropriate PPE we need when planning a job. Provide training to team members on how to use, inspect, and store the equipment and make sure replacement PPE is provided when necessary.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Administrative Controls/Work Practices: Changes in work procedures such as written safety policies, rules, supervision, schedules, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous chemicals or situations.
- 4.2 Engineering Controls: A physical change in the work environment to reduce the duration, frequency, and severity of exposure to a chemical or physical hazard.
- 4.3 Hazard Assessment: A Hazard assessment and its written record, "certification," are required by OSHA for all work activities that require personal protective equipment. A hazard assessment is a systematic review of the chemical and physical hazards of a task and the identification of appropriate controls including PPE.
- 4.4 Hierarchy of Controls: A sequence of hazard control options from most effective to least effective. Work your way down the list and implement the best measure possible for your situation. The most effective is substitution of less hazardous materials or methods, then engineering controls, then administrative controls and finally PPE. Notice that the use of protective equipment is the last resort, to be used when all other control measures have been ruled out in the short term.

5 Policy

- 5.1 Managers must monitor the use, care, limitations and repair/replacement of all PPE to ensure it is adequate to protect our team members.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 Corporate Safety is responsible for maintaining this document.
- 6.3 Managers (supervisors, superintendents, etc.) on the job site are responsible for doing the required hazard assessment as part of the activity planning process.

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7.1 Planning for Personal Protective Equipment

When planning any job, a hazard analysis is required to identify sources of potential hazards and what PPE might be needed. The first step of a hazard analysis should be a walkthrough of the area looking for the sources of potential hazards. Here are some things OSHA suggests you look for:

7.1.1 Identifying Sources of Potential Hazards

- Heat and High Temperatures - Hot process or products could cause burns or eye injuries without PPE.
- Chemical Exposures - Workers who handle chemicals probably need some form of PPE. Check M(SDS) and other manufacturer's literature to see whether the risk includes splashes, skin contact, inhalation, etc., and what form of PPE is appropriate.
- Harmful Dust - Without PPE, this can cause respiratory problems and irritate the eyes.
- Light Radiation - Welding, cutting, heat-treating, furnaces and high intensity lights can produce damaging eye radiation if workers do not have the proper filtered protection.
- Sources of Motion - Many workplace injuries occur when workers and objects collide. Check your equipment to ensure guards are in place and how workers go about their jobs for these hazards.
- Falling or Dropping Objects - Could certain processes or material handling tasks cause objects to drop on the workers or someone below? Do storage areas pose falling or dropping hazards? Proper storage techniques, head, foot and eye protection can prevent these injuries.
- Sharp Objects - Sharp tools or materials that could cut hands or pierce feet without the right PPE.
- Noise – Machinery, tools, or equipment involved in the job or being used in the area that can lead to high noise levels.
- Electricity – Overhead or underground wires, junction boxes, buss bars, temporary power, and electrical cords.
- Rolling or Pinching Objects – Moving parts on machinery or conveyors, equipment swing areas, moving and storing steel beams or bundles of rebar or pipe all provide pinch or crush points.
- Workplace Layout and Worker Positions and Movements - Look for worst-case scenarios. Are operating machines too close to unprotected workers? Are workers trying to carry too much or holding objects carelessly? Are machines properly guarded?

7.1.2 Evaluate the Level of Risk

Consider both the likelihood of occurrence and the seriousness of the potential injury.

7.1.3 Select the Appropriate Control Measures

- Use the hierarchy of controls to eliminate or reduce the hazard. Substitute a less hazardous method or material, use engineering controls, or use work practices to reduce the risk to our team members. PPE is always the last resort.

7.1.4 Select Appropriate PPE

- Choose the appropriate PPE to supplement the controls selected in section 7.1.3. Ensure the PPE selected has a higher level of protection than the minimum required. Selection charts are available from suppliers and manufacturers.

7.1.5 Fit the User

- Make sure that any PPE issued to a team member fits them comfortably. PPE that is too small or too large will introduce additional hazards and reduce the likelihood of the PPE being worn.
See section 7.2 for training requirements.
- The employer is accountable both for the quality of the hazard assessment and for the adequacy of the PPE selected. Conduct reassessments as necessary based on the introduction of new or revised processes, new equipment and/or accident experience to assure the continued suitability of the PPE.
- The hazard assessment itself does not have to be in writing; however, a written certification of its performance must be retained. The hazard analysis section of the activity plan is to be used as the PPE hazard analysis and must contain the appropriate hazard controls and PPE. Be specific as to the hazard and detailed as to the solution (controls). Remember, eliminate the hazard first and avoid having to use additional PPE if at all possible.

7.2 Training

- Once you have decided which PPE to use, workers need to be trained to use it. Training means "hands on" demonstrations by each team member, not a lecture discussing the agenda outlined below. OSHA states that after training, team members must know at least the following:
 - When PPE is called for.
 - What PPE to use for particular hazards.
 - How to properly put on, adjust, wear and remove each piece of PPE.
 - Any PPE limitations and how long the equipment should last.
 - How to properly care for, maintain and dispose of PPE.
- Each team member trained must demonstrate an "understanding" of the training to make sure they can use the PPE effectively to protect themselves from the hazard. The training needs to be certified in writing that it was provided and understood. The certificate of training must include: name of each team member trained, their signature, the date of the training, the subject of the certification and who the trainer was. When lead exposure training is performed, the team member's Cianbro identification number must also be documented.
- All subcontractors on site must be providing and documenting PPE training for their team members. REMEMBER – Cianbro, as the general contractor or construct manager has responsibilities for their subcontractors and contractors being managed by the construction manager.

7.3 Use, Care, Limitations and Repair/Replacement Guidelines

- It is Cianbro's intent to provide the necessary safety equipment for team members to perform their job safely with the exception of hard toed footwear. PPE that is owned by team members may be used providing approval is given and the site management team takes responsibility for the assurance of its adequacy, maintenance, and sanitation.

7.3.1 Body Harnesses and Lanyards

- Use: Use only for its intended purpose. Using a lanyard or any other fall protection device for a rope or any other application other than for its intended use is prohibited.
- Do not wrap a lanyard around an object and then clip it back to itself unless it designed to be used like this by the manufacturer. Otherwise the manufacturer's recommendation strictly forbids this practice due to the acute radius bend it puts in the lanyard, which will result in decreased effectiveness and the fact that the gate of the hook is only rated at 300 lbs for most lanyards. If there is nothing available to clip your lanyard directly to, then a choker or a "cross-arm strap" is recommended.

Manufacturers are developing new anchorage connectors all the time. Check with your Safety Specialist.

- Clipping two lanyards together to lengthen the lifeline is strictly prohibited. Hook-to-hook connections should never be made due to the possibility of roll out.
- Care: Store separately, in a cool dry place, not subjected to direct sunlight and away from tools and sharp objects to prevent cuts or other damage. Harnesses should be kept off floors and away from exposures to chemicals that degrade synthetics. Ideally, body harnesses and lanyards should be stored on a hook or hanger.
- Limitations: Any harness or lanyard that was involved in a fall shall be taken out of service immediately.
- Repair/Replacement: When a harness is worn out or damage of any kind is suspected, take it to the safety specialist for inspection. Each harness should be visually inspected for: cuts, cracks, tears or abrasions, undue stretching, overall deterioration, mildew, operational defects, heat, acid or other corrosion, defective or distorted snap-hooks, faulty springs or stitching pulling out. The Safety Specialist can decide if the harness or lanyard needs to be taken out of service.

7.3.2 Gloves

- Use: Fingers, hands and arms are injured more often than any other part of the body. You must wear hand protection when exposed to hazards such as those from skin absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical burns, thermal burns and harmful temperature extremes. The key is to provide the proper glove for the corresponding application. Example: See glove chart from a glove manufacturer or the M(SDS) when selecting gloves to protect against chemical burns and harmful substances.
- Note: It is mandatory to wear work gloves, appropriate for the hazard, while on project sites just as it is for hard hats, safety glasses with rigid side shields, and hard toed work boots. If an activity can't be performed with work gloves, then it must be addressed in the activity plan and supported by a JHA (job hazard analysis).
- Repair/Replacement: As gloves wear out, tear or develop holes, they should be traded in for a new pair.
- Anti-vibratory gloves: If there is 30 minutes of vibration exposure in an hours' time, team members are required to wear anti-vibratory gloves from the onset of activity.
- Hand and finger injuries account for 40% of Cianbro's recordable incidents. Please wear the proper hand protection.

7.3.3 Ear Plugs

- Use - Ears need to be protected when:
 - The sounds in your work area are irritating.
 - You need to raise your voice to be heard by someone closer than two feet away.
 - There are signs indicating hearing protection is required.
 - Sound levels reach 85 decibels or higher for an 8-hour period.
 - There are short bursts of sound that could cause hearing damage.
- Three different types of hearing protection must be offered to team member earplugs, muffs or canal caps.
- Of the different types of ear plugs available - disposable foam, semi-disposable pre-molded soft silicone, rubber or plastic band type or ear muffs - the disposable foam ear plugs offer the highest level of protection.
- Care and Limitations: Semi-disposable earplugs need to be cleaned daily. Disposable foam ear plugs need to be thrown away at the end of each workday at a minimum to prevent ear irritation. If the earplugs become dirty during the day due to repeated handling, then more frequent replacements are recommended.
- Repair/Replacement: Earmuffs with cracked, cut or missing gaskets reduce your protection. Earmuffs are only as good as their seal around your ear.

7.3.4 Goggles and Face Shields

- Use: Face shield must be used over safety glasses or goggles for double eye protection when operating any power tool. (See SPP 021 Eye and Face Protection for proper selection.) They should also be used when working around bulk chemicals, when vibrating concrete, and any other activity requiring face protection. Check the M(SDS).
- Care: Goggles and face shields should be stored separately away from tools and equipment to prevent scratching of the lenses and damage to the goggles or face shield. Note: Any grinding activity requires tight fitting glasses or goggles to be worn under a solid faceshield. Refer to the Eye Safety Policy and Procedure.
- Repair/Replacement: When your goggles or face shield become scratched, replace them promptly so that your vision is not impaired.

7.3.5 Respirators

- Use: Respirators shall be selected on the basis of the hazards to which the worker is exposed.
- Care: A maintenance and care program for all respirators should include the following basic services: inspection for defects (including a leak check), cleaning and disinfecting, repair and storage.
- Daily respirator inspection shall include a check of the tightness of connections and the condition of the face piece, headbands, valves, connecting tube and canisters. Rubber or elastomer parts shall be inspected for pliability and signs of deterioration. Stretching and manipulating rubber or elastomer parts with a massaging action will keep them pliable and flexible and prevent them from taking a set during storage. When not in use, the respirator shall be stored in a sealed container/bag in an area where the respirator cannot be damaged.
- Routinely used respirators shall be collected, cleaned and disinfected as frequently as necessary to insure that proper protection is provided for the wearer. Respirators maintained for emergency use shall be cleaned and disinfected after each use.
- Repair/Replacement: Only experienced persons shall do replacement or repairs with parts designed for the respirator. No attempt shall be made to replace components beyond the manufacturer's recommendations. Repairs can only be done by the manufacturer or someone trained by the manufacturer. A site specific written plan is required if respirators are to be used. For more information, refer to the respirator Safety Policy and Procedure.

7.3.6 Safety Boots, Hard Hats, Glasses, and Kneeling Pads

- Use: Leather or rubber safety footwear must be a minimum of 6" in height and no canvas or leather type "sneakers or walking shoes" are permitted. Both metallic and non-metallic thermoplastic footwear will be permitted. At least one boot shall be clearly marked as: ANSI Z41.1-1967/75 or 1967/50 or 1967/30. This stamp is typically found on: 1) the inside quarter; 2) shank of the outsole; 3) shank of the insole; or 4) the tongue.
- The only hard hat that is authorized for Cianbro team members use is the Jackson. Each hard hat shall bear I.D. inside the shell stating: manufacturer ANSI Z89.1-1986 Class A, B or C.
- Care: Periodically, check the suspension of your hard hat. Look for loose or torn cradle straps, broken sewing lines or other defects.
- Repair/Replacement: If your hard hat develops any kind of crack in the shell, replace it immediately.
- All items constructed of polymeric materials are susceptible to damage from ultraviolet light and chemical degradation and hard hats are no exception. Ultraviolet degradation will first manifest itself in a loss of surface gloss, called chalking. Upon further degradation, the surface will craze or flake away, or both.
- At the first appearance of either or both of these signs, the shell should be replaced immediately for maximum safety.
- Hold your hard hat upside down; squeeze in on the brim so it deflects an inch or so, and then release. If the hard hat does not immediately spring back into shape, it needs to be replaced.

- All team members must wear safety glasses with rigid side shields. Eye wear must meet ANSI standard Z87.1-2010, and be labeled Z87.1, Z87.2, or Z87+. Practice for Occupational and Educational Eye and Face Protection.
- Store glasses carefully to prevent scratching the lenses and keep the lenses clean so your vision is not limited. If your safety glass lenses become scratched, replace them so that your vision is not impaired.
- Knee or kneeling pads: At minimum, if there will be 10 minutes of kneeling in an hours' time, team members are required to wear knee or kneeling pads. Irregular surfaces may warrant protection from the onset of the activity.

7.3.7 Team Member Clothing (body protection)

- Team member outerwear (clothing) must be appropriate for the activity being performed. Examples: Wearing leathers when welding; wearing chaps when using a chainsaw; (Refer to Cianbro Safety Policy and Procedure "Operating a Chain Saw Safely"); wearing "T" shirts with full 4 inch sleeves to protect team members from sunburns.

7.3.8 Work on Line Circuits and High Voltage Equipment

- This type of work may require special protective clothing. The requirements will be identified by qualified electricians during the activity planning process. Refer to Cianbro Electrical Safety Policy and Procedure section V. F.

7.3.9 Other Precautions

- Team members can add additional protection against hazards like germs and disease through simple activities such as hand washing, using hand sanitizers, wearing sunscreen, covering your mouth when coughing/sneezing, getting annual flu/pneumonia shots; keeping your tetanus shots up-to-date.

7.4 Summary - Remember, our PPE will be best utilized if we:

- Perform a hazard analysis as part of the activity plan.
- Plan ahead for the equipment needed.
- Train team members when PPE is issued.

Managers must monitor the use, care, limitations and repair/replacement of all PPE to ensure it is adequate to protect our team members.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

- 9.1 See attachments.

- 9.2 Please Note: Training manual for presenter and student is located on Cianbro.net under Resources| Manuals| Monthly Safety Training Calendar & Material 8.0 August & 8.1 August.

PPE Quiz

1. True/False When planning any job thought should be put into what potential hazards are in store.
2. True/False The use of PPE makes it physically harder to perform a task.
3. True/False When you are done training a team member on PPE, they should know the limitations of the equipment.
4. True/False If you have trained a team member and certified the training in writing, you are covered under OSHA regulations.
5. True/False You may wrap a lanyard around an object and clip it back to itself as long as the object is larger than 6".
6. True/False A harness and lanyard that were involved in a fall need to be evaluated by the Safety Specialist before they are used again.
7. True/False A key to protecting against hand/finger injuries is to provide the right glove for the right job.
8. True/False You need to wear ear protection only when the safety specialist tells you to do so.
9. True/False Three different types of hearing protection must be offered to team members.
10. True/False Earmuffs are only as good as their seal around your ear.
11. True/False Part of any care and maintenance program for respirators should include inspection for defects.
12. True/False Respirator protection should include a check of the tightness of connections and the condition of the face piece.
13. True/False Respirators maintained for emergency use shall be cleaned and disinfected weekly regardless of when it is used.
14. True/False Replacement/repairs of a respirator should be done by your supervisor.
15. True/False Flexible side shields will only be allowed if a rigid side shield will not fit your glasses.
16. True/False If your safety glass lenses become scratched, replace them so that your vision is not impaired.
17. True/False One of the ways our PPE will be best utilized is if we first plan ahead for the equipment we need.
18. True/False You should periodically check the suspension of your hard hat for torn or damaged straps.
19. True/False One of the things to consider when doing a hazard assessment is any harmful dust.
20. True/False Cianbro uses the activity plan to document the OSHA required hazard analysis.

9.2 Appendix B

Answers to Quiz

- | | | |
|------|-------|-------|
| 1. T | 8. F | 15. F |
| 2. T | 9. T | 16. T |
| 3. T | 10. T | 17. T |
| 4. F | 11. T | 18. T |
| 5. F | 12. T | 19. T |
| 6. F | 13. F | 20. T |
| 7. T | 14. F | |

Policy Number: 032**Authorized By:** Michael W. Bennett**Title:** Hazardous Substance in Boiler Work**Effective Date:** 12/23/08Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To provide guidance for working on industrial boilers and associated systems.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Hazardous Substance:** Any biological agent or other disease causing agent or any chemical present in the workplace that poses a threat to worker health. Typical hazardous substances are toxic, corrosive, ignitable, explosive, or chemically reactive.
- 4.2 **Threshold Limit Values (TLV®):** Are guidelines (not standards) prepared by the American Conference of Government Industrial Hygienists, Inc (ACGIH) to assist industrial hygienists in making decisions regarding safe levels of exposure to various hazards found in the workplace. A TLV® reflects the airborne level of exposure that the typical worker can experience without an unreasonable risk of disease or injury. Cianbro uses the lower of the TLV® or OSHA PEL as the allowable safe level for team members.
- 4.3 **Zinc Protoporphyrin:** A zinc protoporphyrin (ZPP) test is a blood test that can indicate among other things an adverse metabolic effect of lead on your body. ZPP may rise significantly after an unprotected lead exposure. A significant elevation that persists over time (more than one test) may be the result of lead exposure in the 2-3 months prior to ZPP testing.

5 Policy

- 5.1 We will protect team members from the hazards associated with work in these environments.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviation from this policy.
- 6.2 The top Cianbro Manager of the job site is responsible for the implementation of this policy on the project.
- 6.3 The jobsite team is responsible to ensure required medical surveillance per this policy has been complete prior to the start of the job.
- 6.4 The corporate safety department is responsible for maintaining this document.

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7.1 Planning Program Checklist

The following guidelines require consideration when performing work in and around boilers where the health and environmental dangers of hazardous substances exist.

- 7.1.1 Before working in and around boilers where boiler ash by-products can be found, an ash (solid) sample must be collected for analyzing. Expect to find:
- Lead, vanadium, and other heavy metals in oil fired boilers
 - Lead, arsenic, and other heavy metals in coal fired boilers
 - Lead and other heavy metals in trash fired boilers
 - Lead and other heavy metals in other fuel fired boilers (Results of samples taken within the previous year by the host may be used after verifying that boiler operating conditions have not changed.)
- 7.1.2 Sampling and results must be coordinated through the Safety Department for guidance on which substances require special health and safety planning. Refer to Cianbro's Lead and Other Heavy Metal Safety Policy and Procedure.
- 7.1.3 Hazardous substance(s) activities must incorporate engineering and administrative controls, such as mechanical ventilation, job rotation, worker isolation, and work containment in their activity plans to minimize exposures.
- 7.1.4 Appropriate medical surveillance must be instituted, with guidance from the Safety Department, through established medical support facilities.
- 7.1.5 Air monitoring must be done initially and at specific intervals to ensure respirator and PPE (personal protective equipment) is adequate based on results compared to the Permissible Exposure Level (PEL) and Threshold Limit Value (TLV).
- 7.1.6 Jobsite hygiene must be provided. Remember to match the appropriate hygiene controls and practices to the specific hazardous substance being dealt with. (For example: showers are required if air monitoring results show levels of >50 ug/m³ (PEL) for lead. Refer to Cianbro's Lead and Other Heavy Metal Safety Policy and Procedure.
- 7.1.7 Proper respiratory and other PPE must be provided. Again, this will depend on the specific hazardous substance(s) being dealt with, the specific activity being performed (welding, scraping, etc.), and the results of the air monitoring conducted during the initial assessment period. Medical approval, fit testing, and training must be done before wearing a respirator.
- 7.1.8 All team members must receive Cianbro's Hazard Communication Training and activity specific hazardous substance(s) training prior to performing work.
- 7.1.9 Any waste generated must be controlled, stored, labeled, and shipped in accordance with Cianbro's Hazardous Materials and Waste Management Program and any Federal, State or local requirements.

- 7.1.10 If boiler ash sample results show the presence of lead or other heavy metal (at any level) Cianbro's Lead and Other Heavy Metal Safety Policy and Procedure must be followed. Almost always lead is present in boiler ash.
- 7.1.11 A written site specific activity plan covering the hazardous substances team members could be exposed to must be done. Included in the current Major Activity Plan form is a project specific lead/silica protection plan page that includes the basic information required by OSHA which must be completed on all lead activities.

7.2 Hazardous Substance(s) Identification

Before any activity begins involving working in and around boilers, project management must take measures to establish what specific hazardous substance(s) are present in the boiler ash and also determine what types of fuel are being used.

- 7.2.1 If a recent ash sample analysis (current within one year and boiler operating conditions have not changed) is available from the host it can be used. If not, one must be collected and analyzed for hazardous substances.
- 7.2.2 It is also important to know what types of fuels are being used. Different fuels leave different residuals.
- 7.2.3 Specific activities must be identified to determine what levels of respiratory; PPE, ventilation, hygiene, etc. will be required during the initial assessment periods of each activity. (Examples of activities are welding, cutting, burning, scraping, grinding, sweeping, vacuuming, needle gunning, etc.)
- 7.2.4 The Corporate Safety Department should be contacted to discuss development steps prior to drafting a hazardous substance(s) program specific to the project work activities.

7.3 Project Specific Hazardous Substance(s)

- 7.3.1 Training: A competent person, capable of conducting training, identifying existing and predictable hazardous substance(s) in the work area and who has authority to take prompt corrective measures, must be identified.
- Prior to starting any activities involving potential hazardous substance(s) exposure, all affected team members must receive initial job specific training in the following areas:
- Activities that could result in exposures to hazardous substances above their assigned action levels.
 - Health hazards associated with the specific hazardous substance(s) as specified on Safety Data Sheets (SDS) plus Cianbro's Hazard Communication Program Safety Policy and Procedure.
 - Engineering/Environmental/Administrative controls needed (planned for) to minimize substance(s) hazards.
 - Proper use, wear, care and maintenance of PPE.
 - Site-specific written respirator use plan.
 - Complete review of activity plan and sign off by team members.
 - Medical surveillance procedure and team member rights concerning medical records.
 - Review of applicable contents and appendices of OSHA Standards (i.e. 1926.62 and 9.5 Appendix E of Cianbro's Workplace Lead and Other Heavy Metals Protection Program Safety Policy and Procedure for lead hazards).
 - Proper handling/storage/disposal of hazardous wastes.
- 7.3.2 Environmental Controls:
- Supervisors working with hazardous substances must plan and develop environmental safeguards/containment methods to protect against exposures resulting from outside elements (wind, heat, humidity, etc.). Also, protection of hazardous substances from spreading into other work areas or in the environment through unfiltered ventilation/ exhaust or poor work practices needs to be done.

7.3.3 Engineering Controls:

- Engineering control methods must be used to reduce or eliminate exposures to hazardous substances.
- Process/Equipment substitutions should be considered (i.e. by using hydraulic shears instead of a cutting torch or a longer cutting torch instead of the standard short one).
- Isolation may be used as a method of limiting hazardous substance exposure to only those directly involved in the work area by containment and negative pressure to reduce exposure.
- Ventilation or dilution is probably the most important engineering control available to limit airborne concentrations of hazardous substances to acceptable levels. Local exhaust ventilation that includes both portable ventilation systems and shrouded vacuum is generally the preferred method. Remember that HEPA filters must be employed to reduce environmental contamination.
- Negative Air Machines should be used in containment areas. These machines filter the air and help to reduce team member exposure. (Remember to correctly size your machine to your containment area).

7.3.4 Work Practice (Administrative) Controls

These involve the way an activity is performed and can be critical to maintaining a safe, healthy work environment.

- The most effective way to reduce exposure to our team members is for the client to thoroughly clean the boiler before we enter. This can include explosive techniques, power wash, and vacuum. It is to our advantage to work with our clients to clean the boiler as effectively as possible and to help them understand why it will benefit them as well as Cianbro (productivity improvements during the outage, less hazard for their team members, etc.) If the boiler is not adequately cleaned, the job site team must work with the client to get it cleaned to acceptable levels before we start work in it.
- A rigorous housekeeping effort is necessary. Regularly cleaning up ash dust and ash containing debris should be accomplished. **NO DRY SWEEPING!**
- Wet sweep or HEPA vacuum only.
- Initial surface preparation/cleaning must be done before performing planned task. By using a shrouded vacuum needle gun or hand scraper for example to remove any caked on ash before cutting, burning or welding on a surface will reduce/eliminate airborne exposures. Preparation of a surface to a clean state can eliminate or reduce most activities below action levels and/or permissible exposure levels thus eliminating needs for special PPE.
- Vacuuming is usually the most reliable methods to clean up ash dust/debris using a HEPA vacuum filtering system. Pressure wash/vacuum methods, done by a competent professional company, are effective procedures done prior to commencing work.
- Periodic inspection and maintenance of process equipment and control equipment such as ventilation systems is essential to ensure the highest performance is maintained.
- Know the proper way to perform the job task maximizing the effectiveness and minimizing exposures. Wetting of a surface with a water mist before sanding or scraping reduces airborne exposures.
- Good supervision provides needed support for assuring that workers follow proper work practices. Current OSHA standards require frequent and regular inspections of job sites, materials and equipment by a competent person. These should be documented.
- Certain operations should be scheduled at a time when the fewest team members are present who will be subject to hazardous substance exposures.
- Rotate team members in and out of hazardous exposure areas, therefore reducing exposure time for any one individual. **Note:** This cannot be used to reduce exposure to carcinogens.

7.3.5 Medical Surveillance

Medical surveillance may be required when team members are exposed to hazardous substances at any amount and/or above permissible exposure levels for a specified amount of time in accordance with OSHA standards. Medical surveillance is required in the following circumstances:

- A. Team members expected to be exposed to a lead dust or fumes at any level, without regard to the use of respirators, must be protected and follow Cianbro's medical surveillance program for lead. Prior to the job activity involving lead, and at a specific ongoing frequency, team members must have their blood checked for lead (BLL) and Zinc Protoporphyrin (ZPP). (Refer to Cianbro's Workplace Lead and Other Heavy Metals Protection Program Safety Policy and Procedure for medical surveillance test requirements.)
- B. Team members who are, or could be, exposed to inorganic arsenic above the action level of 5 ug/m³ (8 hour TWA), without regard to the use of respirators, at least 30 days per year, must follow Cianbro's medical surveillance program. Contact Corporate Safety to coordinate medical surveillance test scheduling.
- C. Team members who are or may be exposed to cadmium at or above the action level (2.5 ug/m³) for 30 or more days in twelve consecutive months. All team members who perform the following tasks, operations or jobs 30 or more days in twelve consecutive months would need medical surveillance:
 - Electrical grounding with cadmium welding;
 - Cutting, brazing, burning, grinding or welding on surfaces that were painted with cadmium-containing paints;
 - Electrical work using cadmium-coated conduit;
 - Use of cadmium containing paints;
 - Cutting and welding cadmium-plated steel;
 - Brazing or welding with cadmium alloys;
 - Fusing or reinforced steel by cadmium welding;
 - Maintaining or retrofitting cadmium-coated equipment;
 - Wrecking and demolition where cadmium is present.

NOTE: Any team member who is not exposed above the action level of 2.5 micrograms per cubic meter of air (2.5 ug/m³) without regard to the use of respirators, at least 30 days per year does not require medical surveillance. Contact Corporate Safety to coordinate medical surveillance test scheduling.

- D. Medical Surveillance for Hexavalent chromium must be provided to team members who are:
 - Exposed to Cr(VI) (Hexavalent Chromium) at or above the action level (2.5 ug/m³ Cr(VI) as an 8 hour time-weighted average) for 30 or more days a year;
 - Experiencing signs or symptoms of the adverse health effects associated with Cr(VI) exposure (e.g., blistering lesions, redness or itchiness of the exposed skin, shortness of breath or wheezing that worsens at work, nosebleeds, a whistling sound while inhaling or exhaling); or
 - Exposed in an emergency (i.e., an uncontrolled release of Cr (VI) that results in significant and unexpected exposures.
- E. Team members, who may be exposed to dust and fumes from vanadium above the permissible exposure level of 50 ug/m³ (8 hr TWA), must wear appropriate respiratory protection for levels determined from air sampling. Remember proper engineering and work practice controls can almost always reduce levels below the PEL eliminating the need for respiratory protection. Team members exposed to vanadium must follow Cianbro's medical surveillance program. Contact Corporate Safety to coordinate medical surveillance test scheduling. *NOTE:* When possible, please allow 3-5 days for any medical surveillance test scheduling.

7.4 Airborne Monitoring

- 7.4.1 Air monitoring must be done at the start of any activity, each time conditions change and when exposure from dust or fumes of hazardous substances is expected while

working in or around boilers. A change in conditions could be ventilation flow/volume, scraping to grinding, tooling change, heat/humidity, visible airborne dust from adjacent activities, number of people, etc.

- 7.4.2 The results from air monitoring must be time weight averaged to the work shift duration in order to determine the effectiveness of engineering/work practice controls and appropriate PPE (respirators). Sample pumps, cassettes and operation instruction can be obtained by calling the Traveler's Industrial Hygiene Lab (1-800-842-0355) in Connecticut 7-10 days prior to needing the sampling equipment and media. They provide free sampling pumps, sampling media, and expert advice. Call Corporate Safety if you have any questions.

7.5 Hygiene Practices and Controls

- Good hygiene practices are essential for all work activities in and around boilers where potentially contaminated surfaces/areas exist and exposure is expected because of the specific activity.
- Inhalation and ingestion are the two primary routes of entry into the body creating a health hazard. Skin contact of some substances like arsenic can cause dermatitis with burning, itching, swelling, and skin eruptions.

7.5.1 Minimum requirements include providing for:

- Running water, soap (pump able preferred), clean wipes (towels) and trash containers for waste ensuring that team members wash hands and face prior to eating, drinking, smoking, chewing, and leaving the work area/project site.
- Restrict eating, drinking, smoking and chewing in hazardous work areas. Require team members to leave these items in the clean break area.
- Showers and special other requirements may be necessary if exposure from lead is above the action level or if the possibility of or absorption through the skin exists. (Refer to Cianbro's Workplace Lead Protection Program Safety Policy and Procedure for specific other requirements.)
- Clean change and break areas need to be provided to control the spread of hazardous substance contamination on a person's clothing/footwear.
- Personnel must HEPA vacuum themselves off before exiting work area.

7.6 Respiratory and Personal Protection Equipment

- PPE should always be considered as a last resort after best efforts have been made to eliminate/reduce the hazards through effective engineering and work practice controls.
- Typically, at a minimum, gloves, coveralls or tyvek suits, boots and hard hats should be used.
- Appropriate respirators need to be selected for the specific type of activity and substance exposure during the initial assessment period and for ongoing work, depending on airborne level results from sampling. A written site-specific respirator plan needs to be in place (Refer to Cianbro's Respiratory Protection Safety Policy and Procedure).
- It is highly recommended that full face respirators be used inside industrial boilers (Note: It is mandatory on some jobs).

7.7 Recordkeeping

The Safety Specialist and/or Project Superintendent should maintain written documentation as follows:

- Maintain copy of activity plan (active) for ongoing activities and forward copy to the Safety Department.
- Log/record all solid and air monitoring results and calibrations. (Copies to Corporate Safety Department).
- Log/record all medical surveillance completed for team members. (Ensure Safety Department has copies).
- Document training completed.
- Any inspections of the work areas done and results.

7.8 Waste Storage/Disposal

- A designated generator of hazardous waste must be identified. Our contract with the host/client to do the work should clearly state a representative party (preferably the client) acceptance of responsibility for hazardous waste collection, storage, shipping and disposal.
- Lead, cadmium, vanadium and arsenic (and other heavy metals) are all considered to be hazardous substances and depending on concentrations must be disposed of as a hazardous waste in accordance with EPA and Cianbro standards. Currently only two waste haulers/disposal companies are approved to handle waste generated by us - Clean Harbors and Univar. Wastes need to be segregated as much as possible and stored in accordance with Cianbro's storage procedure in the Hazardous Materials and Waste Management Handbook (Cookbook).

For further information, refer to 9.7 Appendix G Boiler Work Guidelines contained in 006 Lead and Other Heavy Metals Safety Policy and Procedure.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all PPE requirements under this policy and to provide necessary training.

9 Related Documents

- 9.1 006 Lead and Other Heavy Metals Safety Policy and Procedure
015 Welding and Cutting Hazard Assessment Program Policy and Procedure

Policy Number: 033**Authorized By:** Michael W. Bennett**Title:** Elevating Work Platforms**Effective Date:** 09/05/05Page 1 of 11

1 Status

- 1.1 Update of existing policy, effective 05/06/14.

2 Purpose

- 2.1 Elevating Work Platforms (E.W.P.) shall be designed and constructed in conformance with the applicable requirements of the American National Standards for Vehicle Mounted Elevating and Rotating Work Platforms. To avoid a serious incident by understanding the safety hazards around the work area and with operating of Elevating Work Platforms (E.W.P.)

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Elevating Work Platform (E.W.P.): A mechanical self propelled device used to elevate personnel to elevating work locations. Cianbro uses both extendable boom platforms and scissor action types of platforms.
- 4.2 Functional Test: A hands-on testing of the functions of the equipment done by the operator.
- 4.3 Job Hazard Analysis (JHA): Inspection of the work areas for potential hazards and identification of methods to control those hazards through substitution, engineering controls, administrative controls and PPE as the last resort. A JHA must include why the method we choose is the safest method and what extra additional control(s) are we going to use to ensure the safety of our team members.
- 4.4 Minimum Approach Distance (M.A.D.): The allowed distance between the elevating work platform and an energized line or part. This applies also to temporary construction power lines and cord. Reference the table in Appendix B of this policy.
- 4.5 Rated Load Limits: The combined static weight, in pounds, of team members and materials in the E.W.P. platform. Never exceed the manufacturer's rated load limits in the platform.

5 Policy

- 5.1 Use of Elevating Work Platforms (E.W.P.) shall be used to access work areas that are not easily accessible or is the safer way of accessing an area to complete a task. E.W.P. can be of a Snooper or Bridge master design that can reach down and under structures for inspections or repairs. Or, an extendable boom or scissor lift design that can access work areas from ground or floor level up to the work areas.
- 5.2 Elevating Work Platforms (E.W.P.) shall be designed, and constructed and operated in conformance with the applicable requirements of the American National Standards for Vehicle Mounted Elevating and Rotating Work Platforms, OSHA 29. CFR 29 1910, OSHA 29. CFR 29

1926, MSHA standard, ANSI/SIA A92.6-1990 (Self-Propelled Elevating Work Platforms), and Cianbro's requirements.

6 Responsibilities

- 6.1 Cianbro is responsible to provide sound principles of safety, training, inspection, maintenance, application and operations consistent with all resource data available from the manufacturer, OSHA and ANSI.
- 6.2 Project Management is responsible for the implementation and execution of these standards. Since each job site has direct control over the application and operation of elevating work platforms, good safety behavior in this area is the responsibility of Project Management and his/her assigned operating personnel. Decisions on the use and operation of the Elevating Work Platforms must always be made with due consideration that the machine will be carrying personnel whose safety is dependent on those decisions.
- 6.3 Operators must exercise good judgment, safety controls and caution in evaluating each situation. Safety of all personnel in the elevating work platforms is dependent on safe use and operation by the operator.
- 6.4 Having more than two team members in the platform must be approved by the project manager on site.
- 6.5 Operating E.W.P. within twenty feet (20') of energized power line must have the approval of the superintendent.
- 6.6 Any deviation from this policy requires a thorough JHA and approval by the Vice President of Health, Safety, Environmental and Human Resources or designee.
- 6.7 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.8 The Corporate Safety Department is responsible for maintaining this document.

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7.1 Planning

Ensure that safety considerations are evaluated for the safe use of Elevating Work Platforms and written into the job task specific activity plan. The following issues must be planned for and incorporated into the activity planning process.

7.1.1 Identify competent operator(s) whom

- Have been trained by a qualified person to Cianbro's Elevating Work Platforms Certification Program.
- Have read and understand manufacturer's operating instructions for the particular elevating work platform they are going to use.

7.1.2 Conduct workplace inspection checking for hazards in the area where the Elevating Work Platform is to be used. Possible hazards such as but not limited to

- Drop-offs or holes and uneven terrain
- Bumps and floor obstructions
- Debris
- Overhead obstructions and high voltage conductors
- Hazardous locations
- Inadequate surface and support to withstand all load forces imposed by the Elevating Work Platforms in all operating configurations
- Wind and weather conditions
- Presence of unauthorized persons
- Evaluate swing radius for pinch/crush points and barricade as needed
- Other possible unsafe conditions
- Working above or below other crews
- Working on barges where tie-downs are required
- Working over water
- Presence of energized lines or parts

7.1.3 Evaluate expected loading for platform and ensure capacities for each specific configuration are within manufacturer's limits. Include also added weight that could come from a welding lead, for example, hanging out of an Elevating Work Platform to cart below.

7.1.4 Manufacturer Provided Tie off Point

This policy requires team members to use the anchorage points provided for by the manufacturer for each lift. Refer to the Operator's Manual for each piece of equipment. In the case of some scissor lifts, there is no anchorage point provided by the manufacturer. If no point is provided, tie off to the lowest possible structural anchorage point in the basket no higher than the mid-rail. This requirement is to keep each team member within the basket not to catch the team member if they fall out of the basket because of the risk of pulling the lift over on top of you. If there is no point provided, most lifts can be retrofitted with an anchorage point. Contact Cianbro Equipment, LLC.

7.1.5 Include in activity plans emergency response/actions.

7.2 Inspection and Maintenance

7.2.1 Pre-Start Inspection

Inspections are to be done each day of use or at the beginning of each shift. The E.W.P. shall be given a visual inspection or visual inspection with functional tests on the following items by the operator

- Operating and emergency controls
- Safety devices
- Personal protective devices, including fall protection
- Air, hydraulic and fuel system(s) leaks
- Cables and wiring harness
- Loose or missing parts
- Tires and wheel
- Placards, warnings, control markings and operating manual(s)
- Outriggers, stabilizers, extendible axles and other structures
- Guardrail system
- Other items specified by the manufacturer
- Complete daily, Cianbro's "Operators Safety Inspection" (SH925) card and turn in weekly with explanation of all noticed defects

Note: Any problems or malfunctions that affect the safe operations shall be repaired prior to the use of the Elevating Work Platforms.

7.2.2 Frequent Inspection

- Once each month a frequent inspection shall be completed using Cianbro's "Equipment Inspection" card (OP410). Frequent inspections must be done by a qualified mechanic or the assigned E.W.P. operator. If more than one individual is operating a particular aerial lift, one operator shall be designated by Project Management to be responsible for conducting frequent inspections at the job site.
- Functional Test:
 - Engine Running: Manually operating controls from the ground, while the engine is running, to test the functions of each manual control valve. (i.e.: raising boom up and down, scoping sections of the boom out and back in, swinging right and left and articulating the platform). It is better to find a fault in the operation of components on the ground than while up in the air.
 - Engine Not Running: Using the electric over-ride switch on ground controls to test the above functions (Engine Running). The same controls are also on the platform controls and are to be used in an emergency situation in the event that the engine stopped working.
 - Manual Descent Valves: Can test the operation of these valves on equipment having them. The valves can only be operated by a team member on the ground to bring team members in the platform back down to the ground. Used only for testing and when team members are stranded in the air and both the engine and electric over-rides are not working. These valves will only scope in the boom and then boom down to safety.
- Safety related items are to be written down on Cianbro's "Operators Safety Inspection" (SH925) card, key removed and tagged "DO NOT OPERATE" until a mechanic has serviced or repaired the EWP.

7.2.3 Annual Inspection

Project Management shall assure an annual inspection is performed on the E.W.P. no later than thirteen (13) months from the date of the prior annual inspection. The annual inspection must be performed by an individual qualified as a mechanic or the operator designated by Project Management to be specifically responsible for frequent and annual inspection of specific aerial lifts at the job site. The inspection shall include the completion of Cianbro's "Equipment Inspection" card (OP410) and any additional items specified by the manufacturer for an annual inspection.

7.2.4 Special Incident Inspection
An annual inspection shall be conducted before continuing the operation of an Elevating Work Platform following any incident where the Elevating Work Platform has obvious or suspected operational damage. This special incident inspection (annual) must be supported by communications to the manufacturer of the Elevating Work Platform requesting any additional specific inspection or maintenance checks that should be done.

7.2.5 Visual Inspection
Do a visual walk around survey of the EWP. Team member would look for damages, leaks from hoses, cracks, missing or damaged safety decals, fluids on the ground, gate not closing, flat tires, etc.

7.2.6 Maintenance/Repairs
All maintenance and repairs shall be made by a qualified person in conformance with the manufacturer's recommendations. Scheduled maintenance may exceed the manufacturer's minimum requirements as determined by Cianbro's equipment group. Aerial lifts shall not be used under the following conditions:

- Elevating Work Platforms that are not in proper operating condition as determined by either the operator or Project Management shall be immediately removed from service until repaired.
- Any time there are problems or malfunctions that affect safe operations or safety systems on the Elevating Work Platform.

7.3 Operator Training

7.3.1 Operators must be trained and certified and only authorized team members shall operate an Elevating Work Platform. Cianbro has trained a minimum selected number of team members in each geographical regional area who are competent Elevating Work Platform training instructors. ONLY those individuals who have successfully passed Cianbro's train-the-trainer program can conduct operator training for Cianbro operators. Contact the corporate safety department if there are any questions about who is authorized to train Cianbro team members as operators.

7.3.2 Since Cianbro's fleet includes more than one type (manufacturer) of Elevating Work Platform, plus rental units, the operator must also read and understand the manufacturer's operating and maintenance manual for the specific Elevating Work Platforms they are expected to operate prior to operating the equipment.

7.3.3 Operators on the Truck Mounted work platforms, such as the Bridge Master or Snooper Truck bridge inspection trucks, may be required to have a valid CDL – B or A driver's license, DOT - Physical and have completed the requirements of Cianbro's 'Fleet Driver Level III or IV' certifications.

7.4 Subcontractors or Clients Team Member Use of Cianbro Equipment

7.4.1 Note: Under certain circumstances, with the Cianbro Project Managers approval, subcontractor/client/team members may be allowed to use and operate Cianbro furnished elevating work platforms provided the following procedures are strictly adhered to:

- The subcontractors must have acknowledgement, signed, and returned the subcontract issues by the Cianbro Corporate Purchasing Department agreeing to all terms, including the insurance and indemnification requirements. (This requirement does not apply to team members of client.)
- Each subcontractor/client operator must show evidence of appropriate training in accordance with OSHA, and any other pertinent regulations, including all contract safety requirements.
- Each of the subcontractor/client proposed operators shall sign the "Apparatus Supplied by Cianbro" agreement form.

- The subcontractor/client supervisor and the Cianbro supervisor will perform a thorough equipment inspection, before and after the subcontractor's use of the equipment to determine any damage or malfunctioning components. The results of this inspection shall be documented on a form meeting OSHA and Cianbro requirements. Any damage or defects not noted during this inspection shall become the responsibility of the subcontractor/client. The subcontractor/client operator shall perform daily inspections in accordance with the manufactures requirements.

7.4.2 Cianbro will not be responsible for operator training for subcontractor personnel. It is the responsibility for the subcontractor to secure the necessary training and to provide the acceptable certifications in accordance with the manufacturer's requirements.

7.4.3 This subcontractor use policy only applies to elevating work platforms with a reach capacity of less than forty feet (40'). All other equipment will be operated by a properly trained Cianbro Team member. Exceptions to this rule must be approved by the Regional Vice President. In the event that an exception is approved allowing a subcontractor/client team member to operate an elevating work platform with a reach capacity of forty feet (40') or more, all other requirements of this policy shall be strictly adhered to.

7.5 Operations

7.5.1 Since the operator is in direct control of the E.W.P., conformance with good safety practices in this area is the responsibility of the operator. The operator must make decisions on the use and operation of the E.W.P. with due consideration that his/her own safety as well as the safety of other personnel in the platform is dependent on those decisions. During operation, the E.W.P. shall be used in accordance with Cianbro requirements, manufacturer operation specifications and the following specific guidelines.

- Ensure the Elevating Work Platform is operated on a surface within the limits specified by the manufacturer.
- Ensure the outriggers, stabilizers, extendible axles or other stability enhancing means are used as required by the manufacturer.
- Ensure that guardrails are in a safe condition and access gates or openings are closed per manufacturer's instructions.
- Ensure the load and its distribution on the platform and any platform extension(s) are in accordance with the manufacturer's rated capacity for that specific configuration.
- Ensure there is adequate clearance from overhead obstructions.
- Ensure that the boom, boom knuckles, basket, counterweight and tires have adequate clearance to avoid contact. Use of spotters is recommended.
- Ensure that the Minimum Approach Distances (M.A.D.) to energized (exposed or insulated) overhead power lines and parts are maintained including temporary construction power lines/cord sets. (See attached figure 2 for safe operating procedures.)
- Ensure that team member's fingers are inside the guard railings while moving the platform.
- Ensure that team member and operator have communicated and completed task before moving.
- Ensure that the bottom of boom style E.W.P. platform is not buried in earth (debris damaging greased knuckles or damaging hydraulic line).
- Ensure that a fire extinguisher is in the platform for hot work.
- Considerations when hanging air hoses, electric cords and ropes over the sides of the platform:
 - Calculate the weight of these items into the rated load limit of the platform.
 - Use care that these items do not snag onto something that would cause side loading and possibly tip E.W.P. over. Use the internal airline or electric lines to supply air and electric power to the platform.
- Do not disconnect warning lights or alarms.

- Ensure that the platform is not in contact with another structure before moving (i.e. top rail has pressure against the bottom of a steel structure when moving which will cause a catapult effect to the occupants.)

Note: Operations within 20' of energized (exposed or insulated) power lines requires compliance with Cianbro's safety practices including a written activity plan approved by the Safety Officer before activity starts.

Note: The sign of a good operator is a smooth operator. Ease into and out of the controls.

Note: If the engine does not start – try the following:

- Most E.W.P. will not start if a foot is depressing the pedal in the platform pod. This pedal is used to operate the hand controls on the console.
- Ensure that the master switch is **on** (switch will be near the engine or battery box).
- Ensure that the ground control switch is in the platform position to start at the platform.
- Never tow E.W.P. with out contacting the mechanic first (may damage hubs in wheels).
- Ensure that all decals around the E.W.P. and on the platform controls are in place and can be read.
- No horse playing with other team members up in the platform. (i.e. turning the switch at the ground control panel from PLATFORM to GROUND controls, then moving their platform around).
- Ensure that an Operator's manual is on the E.W.P. (water proof box or blue pouch).
- Keep an eye on the weather. (wind loading on the platform and lightning.)
- Ensure that a Minimum Approach Distance (M.A.D.) to energized (guarded) power lines associated with installations at fixed/permanent facilities is maintained and under the direct supervision of a qualified individual electrician. For example, insulated energized power lines lying in a cable tray, in conduit attached to a permanent structure or an "armor" guarded power line may be approached to a M.S.O.D. but avoiding contact. A written activity plan must be developed with documented review (sign off) by a qualified individual (electrician) who is directly responsible for the work activity.
- Ensure all personnel in the platform are wearing fall protection devices and other safety gear as required at all times. (100% fall protection required for any reason while in the aerial or scissor lift) Tie off only to manufacturer provided anchorage points in the platform and not handrails.
- Ensure only essential materials and tools required to perform the work from the lift are in the platform and fit completely inside, taking into account total weight inside the platform. Never exceed manufacturer's rated load limits! Know the range and capacity of your Elevating Work Platform!
- **Work must be accomplished by standing firmly on the platform floor. Never stand on mid rail, hand rails or top rail to perform work!**
- Any deviation from this requirement must have a written job hazard analysis (JHA) developed and approved by the corporate safety director or designee. Complete the tasks out of elevating work platforms form available on Cianbro.net; include it with a written activity plan and forward to the corporate safety director for approval.
- Conduct workplace inspection for hazards in the work area. (See section 7.1 Planning).
- When operating from a barge ensure that the Elevating Work Platform is positively secured to the barge deck using tie down eyes and appropriate anchorage points. Anchorage needs to ensure wheels remain firm on barge deck. Use four-point tie down or equivalent method. Never secure to anything loosely lying on the barge deck!
- Never use the aerial lift for hoisting, towing or pulling.

- Never place heavy objects on hand rails or come in contact with objects that could damage railings or platform.
- Immediately report any problems or equipment malfunctions occurring during operation to your supervisor. Do not continue to operate the Elevating Work Platform if unsafe conditions occur during operations!
- Never alter, disconnect or disable interlocks or other safety devices that would allow operation in violation of manufacturers specifications.
- Ensure care is taken to prevent entanglement in ropes, wires, cables, etc.
- Ensure work area below Elevating Work Platform is clear or barricaded from team member traffic in case something is dropped from work platform (or use railing mesh, etc. to prevent tools and materials from falling).
- Retract and lower boom to lowest possible position, maintaining good viewing, before attempting to travel.
- Ensure that the movement alarm is operational and that the travel way is clear of debris and personnel. A spotter is required whenever the movement alarm is not functioning or if travelling in congested areas. Travel speed must be appropriate for surface conditions. Watch for overhead obstructions!
- Shut engine off during refueling and fuel only in a well-ventilated area free of other flammable/combustible materials.
- Never travel on grades, side slopes or ramps exceeding those for which the aerial lift is rated by the manufacturer.
- Should Elevating Work Platform become snagged or caught up while operating, preventing normal operation/motion, remove personnel from platform before attempting to free the platform using ground controls.
- Never alter or modify an Elevating Work Platform without written permission from the manufacturer and Cianbro's equipment group.
- Never attempt to operate an Elevating Work Platform from below (ground controls) when it is already in use, except in an emergency situation. Example: Team member is using E.W.P. for access to upper levels where it requires operator to leave the work platform to do his/her work. The operator conducting work at upper levels who has to physically leave the lift platform must give approval for intermediate use.
- Scissor lifts must be operated from inside the basket. Walking beside a moving lift in order to move it creates additional hazards. In special cases where it is not possible to be in the basket (Example: Rails are lowered to get through a doorway) a specific plan must be completed by the supervisor. The plan can be documented in a JHA format or on an Activity Plan but it must include provisions for the operator to maintain adequate distance from the lift as it travels, use of spotters, and address any other hazards that are created by the operation. This written plan must be approved by the top manager on the site prior to the activity.
- No more than two people shall be in an Elevating Work Platform at any one time without the approval of the top manager. Under no circumstances shall more than two people be allowed in the E.W.P. platform if the manufacturer prohibits the practice.
- Although OSHA considers scissor lifts and vertical mast (e.g. Genie) lifts to be scaffolding not requiring tie off if fully railed, Cianbro requires team members to tie off at a low point (mid-rail or below) while in the lift to restrain team members from falling over the hand rail. Newer lifts of these types have manufacturer supplied tie off points. Older lifts can sometimes be retrofitted. Remember: Elevating Work Platforms are a key component in our routine work activities today, enabling us to perform work safely, efficiently and productively. We must always be conscious to respect their capabilities and the potential for serious incidents resulting from improper use, care, inspections, maintenance and operations.

8 Budget / Approval Process

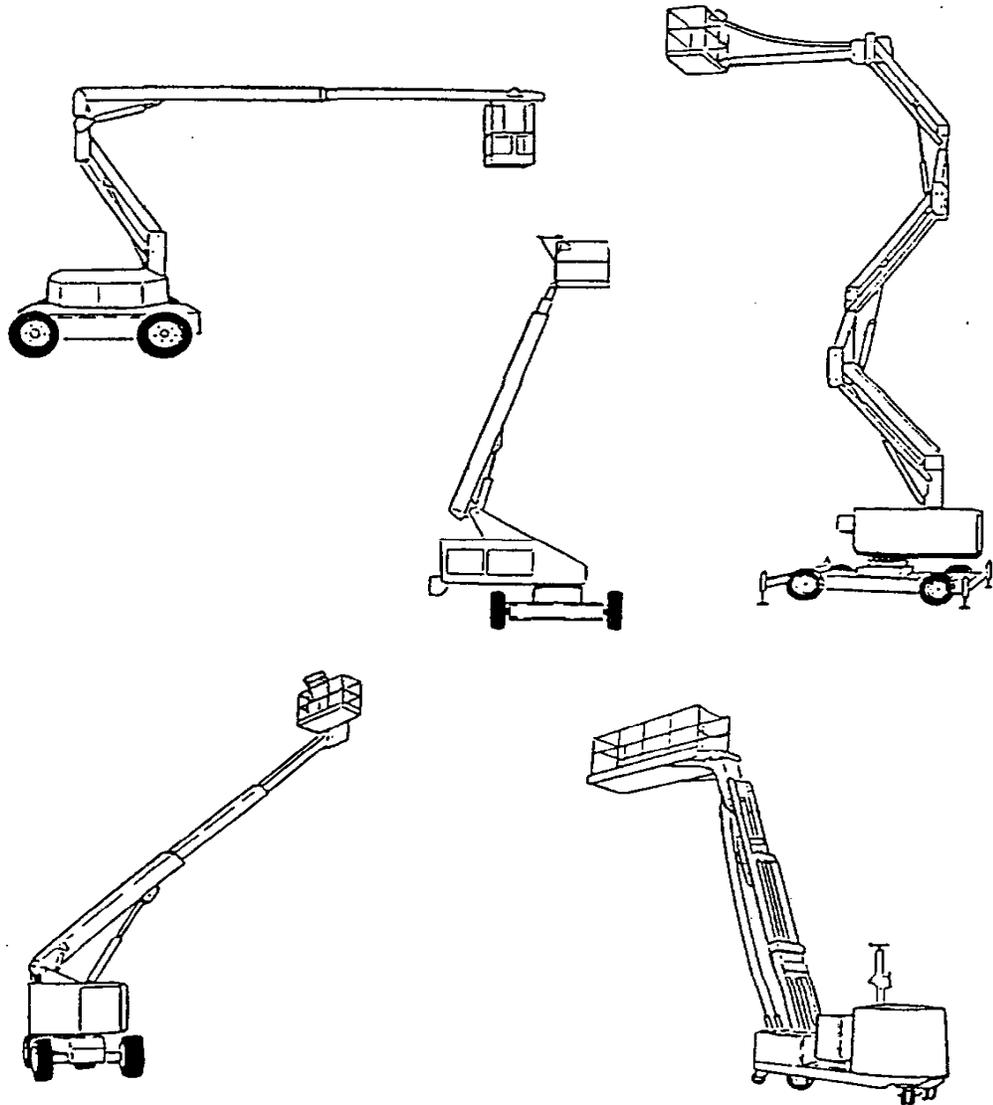
- 8.1 Any modification to the E.W.P. must be a joint approval between the E.W.P. manufacture and Cianbro Equipment, LLC.
- 8.2 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments.
- 9.2 Documents available on Cianbro.net > Standard Operating Procedures – SOP

Tasks Out of Elevating Work Platforms	SD1073
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Examples of Elevating Work Platforms



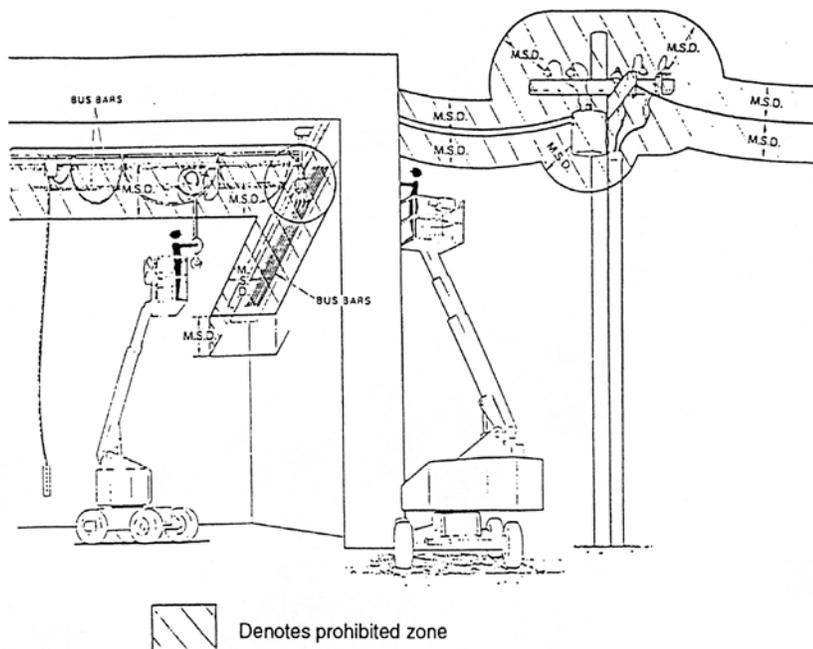
Minimum Approach Distance (M.A.D.)
To energized (exposed or insulated) power lines.

Voltage range (phase to phase)			Minimum safe approach distance	
			(Feet)	(Meters)
0	to	300V	Avoid Contact	
Over 300V	to	50kV	10	3.05
Over 50kV	to	200kV	15	4.60
Over 200kV	to	350kV	20	6.10
Over 350kV	to	500kV	25	7.62
Over 500kV	to	750kV	35	10.67
Over 750kV	to	1000kV	45	13.72

Note: For Scissor or Genie type lifts, the minimum approach distance in the 0 to 300 volt voltage range is 3 feet (0.91 meters) instead of "Avoid Contact" since OSHA considers these types of lifts to be scaffolds.

Minimum Approach Distance (M.A.D.)

Figure 2



Danger: Do not allow machine personnel or conductive materials inside prohibited zone. Maintain M.A.D. from all energized lines and parts as well as those shown. Assume all electrical parts and wires are energized unless known otherwise.

Caution: Diagrams shown are only for purposes of illustrating M.A.D. work positions not all work positions.

Policy Number: 034**Authorized By:** Michael W. Bennett**Title:** Workplace Crystalline Silica Protection Program**Effective Date:** 08/01/98Page 1 of 23

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 To reduce team member exposure to airborne crystalline silica to below the OSHA Permissible Exposure Limit (PEL) by means of substitution, engineering controls, work methods and administrative controls.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Carcinogen: A substance that causes the development of cancerous growths in living tissue.
- 4.2 Crystalline Silica: The crystalline forms of silicon dioxide (SiO₂). Quartz is the most common form. Cristobalite and Tridymite are two other crystalline forms that might be encountered. These crystalline forms are the dangerous ones.
- 4.3 Permissible Exposure Limit (PEL): This is the OSHA allowable concentration limit in air that a team member can be exposed to for an eight-hour day.
- 4.4 Pulmonary Function Test (PFT): Pulmonary function test. This test is designed to determine how well your lungs are working. There are several pieces that can be part of the PFT:
- FVC - forced vital capacity
 - FEV₁ - forced expiratory volume in one second,
 - DLCO - diffusion capacity for carbon monoxide, radiographic
 - TLC - total lung capacity.
- 4.5 Respirable: Particles small enough to be drawn deep into the lungs and that are below 10 microns in size (too small to be seen by the naked eye).
- 4.6 Silicosis: A progressive disease of the lungs that reduces the ability of the lungs to extract oxygen from the air. It is caused by exposure to respirable crystalline silica dust particles. The damage cannot be reversed.
- 4.7 Threshold Limit Value (TLV): This is a recommended allowable concentration limit in air that a team member can be exposed to for an eight-hour day.

5 Policy

- 5.1 Cianbro team members, subcontractors and the public will be protected from the hazards associated with crystalline silica.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

7 Crystalline Silica Protection Program Index

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7.1 Scope

- 7.1.1 This safety policy and procedure covers all operations that have the potential of creating exposure for personnel (Cianbro, subcontractor, client, or general public) to dusts containing crystalline silica.

7.2 Purpose

- 7.2.1 Note: OSHA released a National Emphasis Program for Crystalline Silica in 2008. OSHA released a proposed crystalline silica standard in 2013. The final standard has not been released.
- 7.2.2 The program requires local OSHA offices to do the following:
- Outreach to companies.
 - Develop a local emphasis program for crystalline silica by targeting specific industries and doing inspections randomly within that industry.
 - Do follow up inspections whenever overexposures are found.
 - During the inspection OSHA will do air sampling, review engineering and work practice controls in use, review the respiratory protection program, look for records of HAZCOM training, look at labeling of carcinogens containing products (crystalline silica is considered a carcinogen), review housekeeping practices related to crystalline silica containing materials, review hygiene practices, look at medical and exposure records retention, and look at any abrasive blasting.
 - OSHA will focus specifically on crystalline silica, but will cite any other serious hazards they encounter and many other standards apply to this type of work as well (hearing conservation, respirator use, HAZCOM training, etc).
 - The entire National Emphasis Program is available at http://www.osha.gov/OshDoc/Directive_pdf/CPL_03-00-007.pdf

7.3 Training

- 7.3.1 All team members must have Silica Awareness Training prior to working on tasks with exposure to crystalline silica. The training must include:
- Health Effects of crystalline silica (See Appendix C)
 - How to protect yourself from crystalline silica (See Appendix D)
 - Site specific silica hazards/exposures
 - Contents of the silica protection plan
- 7.3.2 All team members will be initially trained in the hazards of silica and at least annually thereafter.

7.4 Procedure

- 7.4.1 Identifying Silica Hazards
Crystalline silica is a natural constituent of the earth's crust and is a basic component of sand, concrete, brick, asphalt, granite, some blasting grit, and wall spackling materials. People may be exposed to crystalline silica hazards when around activities like:
- Abrasive blasting
 - Jack hammering
 - Concrete crushing

- Hoe ramming
- Rock drilling
- Mixing of concrete or grout
- Concrete drilling
- Sawing concrete, concrete blocks, or bricks
- Chipping or scarifying concrete
- Rock crushing
- Moving or dumping piles of concrete, rock, or sand
- Housekeeping activities (shoveling, sweeping, vacuuming, etc.)
- Demolition involving any of these materials
- Using coatings containing crystalline silica
- Removing coatings containing crystalline silica

Before any activity begins, project personnel must assess the work and identify possible exposures. Remember that concrete contains Portland Cement with silica and rock that contains silica. Quartz is the most common form of crystalline silica and is one of the most common minerals in the earth's crust. Also, whenever available consult the MSDS(s) for the materials with which you are dealing. Even materials containing small amounts of crystalline silica may be hazardous if they are used in ways that produce high dust concentrations.

7.4.2 Planning For Silica Exposure

In order to manage the silica hazard, project personnel must plan for potential team member health and environmental impacts before the work begins. Each activity with the potential for silica exposure must be addressed in a job specific activity plan (see 9.2 Appendix B) that focuses on eliminating or minimizing silica exposure through substitution, engineering controls, work practices and methods, air monitoring, effective hygiene practices, PPE, training, environmental controls, and waste disposal. Section 7.3.3 sets forth the requirements of a job specific silica plan.

7.4.3 Health Effects of Crystalline Silica

- A. **Carcinogenicity:** Carcinogen - Known to cause: lung cancer.
 - International Agency for Research on Cancer (IARC): Group 1 - Carcinogenic to humans.
 - American Conference for Governmental Industrial Hygienists (ACGIH): A2 - Suspected human carcinogen.
- B. **Silicosis:** Breathing crystalline silica dust can cause silicosis, which can be disabling, or even fatal in severe cases. The respirable crystalline silica dust enters the lungs and causes the formation of scar tissue, thus reducing the lungs' ability to take in oxygen. There is no cure for silicosis.
- C. **Other lung diseases:** Since silicosis affects lung function, it makes one more susceptible to lung infections like tuberculosis. In addition, smoking causes lung damage and adds to the damage caused by breathing silica dust
- D. Refer to Section 9.3 Appendix C for more information

7.4.4 Silica Exposure Limits

Cianbro will follow the Proposed permissible exposure limit (PEL) as the current PEL is more than 40 years old and is not considered protective enough by OSHA.

A. PEL

- Proposed PEL - OSHA has proposed 0.05 mg/m³ as the PEL with an action level of 0.025 mg/m³ for the respirable fraction. Cianbro will use this limit to protect our team members.
- Current OSHA permissible exposure level is calculated from a formula. The Silica Special Emphasis Program specified that the formula from general industry could be used. The PEL is based on the amount of respirable dust that is in the air and the amount of crystalline silica contained in that dust.
The formula is: $PEL = \frac{10 \text{ mg/m}^3}{\%Quartz + 2}$

7.4.5 Establishing a Job Specific Silica Protection Plan

A.

- Documented training will include:
 1. Information about the potential health effects and symptoms of exposure to respirable crystalline silica. See 9.3 Appendix C.
 2. Material safety data sheets for silica, quartz, and applicable products containing silica.
 3. Purpose and set up of regulated areas marking the boundaries of work areas containing silica dust.
 4. Discussion of the importance of substitution, engineering controls, work practices, good housekeeping, and personal hygiene in reducing crystalline silica exposure.
 5. Use and care of appropriate PPE including respirators.
 6. Expected exposures, controls in place to minimize exposure, and how to set up, use, maintain, etc. the controls to be used.
 7. The contents of this safety policy and procedure.
 8. Hygiene.
 9. Availability of air monitoring and medical surveillance results.

B. Substitution, Engineering Controls, and Work Practices

In order to control the hazards of crystalline silica, you must first look at alternate methods of doing the work, substitution of less hazardous materials, engineering controls, and work practice controls to reduce the exposure to crystalline silica to below the OSHA Permissible Exposure Limit (PEL). The job specific plan will contain information on what methods, substitution, engineering and work controls were considered, why or why not they are feasible, and which controls the job is going to use. 29 CFR 1926.55 requires us to use feasible engineering or work practice controls to reduce team members' exposure to below the PEL.

C. Some possible substitution or engineering controls:

- Substituting non-silica containing materials for use while abrasive blasting.
- Alternative methods (i.e. ordering grout from a concrete plant rather than mixing it onsite).
- Local exhaust (follow requirements of 1926.57).
- General ventilation (follow requirements of 1926.57).
- Vacuum methods with HEPA filters (vacuum shrouded tools like grinders, needle guns or saws).
- Use hepa-filtered shop vacuum at point of dust generation
- Distance (using a long handled grinder to allow standing up while grinding a floor or using a remote controlled unit like a scabblor, etc.).
- Dust control products for use on dusty roads or piles of material.
- Containment.
- Equipment with pressurized cabs and filter systems.
- Use of water hoses, spray booms, etc.
- Use of tools with dust control systems (water on saws or drill bits etc.).
- Diamond rope saw to cut concrete.
- "Chinese dynamite" e.g. slow expanding materials designed to break up concrete.

D. Some possible work practice (administrative) controls:

- Working during hours other crews are not.
- Restricting access to the work areas.
- Good housekeeping practices (not allowing dust to build up, etc.).
- Specific standard operating procedures that minimizes dust produced by a task.
- Green cutting with a hydro blaster before concrete sets up.

These are only some suggestions; there are other controls we can use. Some combination of these or other controls will allow us to reduce the exposure to

below the PEL. The object is to keep the dust out of the air. Be creative and share what you learn. Remember that you must use feasible controls even if they do not completely reduce the exposure to below the PEL

E. Initial Assessment and Exposure Monitoring

Once all feasible engineering and administrative controls have been decided, you must determine what PPE is needed to supplement the controls. An initial assessment must be made to determine what the expected exposures will be. For respiratory protection this initial assessment will be based on either current Cianbro representative data (within the last twelve months and involving similar conditions: tools, engineering or administrative controls, area characteristics, work methods, etc.) or the following table of silica dust generating work activities that has been compiled from representative data. Either of these methods will provide a starting point for respiratory protection until you verify the exposure through ongoing air monitoring.

Cianbro Task Assessment Guide

Respirator	Protection Factor	Typical Silica Activity
Half face with HEPA filters Full face with HEPA filters PAPR with HEPA filters Supplied air respirator SCBA	Up to 0.5 mg/m ³ for quartz cristobalite or tridymite	Housekeeping (wet method) Sawcutting (wet method) Drilling concrete (wet method) Power tools with dust collection Equipment operating (open cab) Other activities not creating visible dust
Full face (quantitatively fit) PAPR with HEPA filters Supplied air respirator SCBA	Up to 2.5 mg/m ³ for quartz cristobalite or tridymite	Chipping concrete Jack hammering
PAPR with HEPA filters Supplied air respirator SCBA	Up to 5 mg/m ³ quartz cristobalite or tridymite	Power tools without dust collection Mixing grout (bulk) Vacuum abrasive blasting
Supplied air respirator SCBA Abrasive blasting hood respirator	Over 5 mg/m ³ quartz cristobalite or tridymite	Abrasive blasting

- You must perform air monitoring for each activity and for each job classification (e.g. both the hoe ram operator and the person spraying water to keep the dust down) that provides a potential exposure to crystalline silica. If methods or controls used change, further air monitoring must be done. You can use one or more persons to represent a group as long as you sample the person(s) likely to have the highest exposure. Reference the Cianbro IH manual for sampling methods (Note: the sampling procedure for the new OSHA proposed PEL is different than for the current PEL formula) and calculations or contact the HSSE Manager. Copies of field sampling data sheets must be sent to the HSSE Manager in Corporate Safety. Based on the results obtained, adjust the level of respiratory protection up or down as appropriate. For each activity, air monitoring frequency may be reduced to every six months if two consecutive tests taken at least seven days apart show results below 50% of the PEL. However if conditions, methods, activities, or controls used change then you must start air monitoring again

F. Personal Protective Equipment

- PPE for work around silica containing dust includes:
 - Disposable or reusable work clothing to keep from spreading the dust or bringing the dust home.

2. Leather gloves.
 3. Safety glasses (goggles may be appropriate).
 4. Face shield.
 5. Respiratory protection.
 6. Boot covers or way to remove silica dust from boots (water hose for rubber boots, HEPA vac for leather boots).
- Until the level of team member exposure to crystalline silica is known to be below the PEL or if the use of feasible engineering and work practice controls is not sufficient to reduce the exposure to below the PEL, respiratory protection is required in accordance with 29 CFR 1910.134 and Cianbro's respiratory protection program. See the bullet point titled Initial Assessment and Exposure Monitoring section 7.3.3.

G. When selecting respirators, use the following guidelines:

Exposure Level	Minimum Required Respirator
< PEL	Voluntary use of any approved respirator if determined by the competent person to not create any other hazard
PEL to 10xPEL	Half respirator with 100 efficiency (HEPA) filters Full face respirator with 100 efficiency (HEPA) filters (qualitatively fit)
10xPEL to 25xPEL	Loose fitting PAPR with 100 efficiency (HEPA) filters
10xPEL to 50xPEL	Full face respirator with 100 efficiency (HEPA) filters (quantitatively fit)
50xPEL to 100xPEL	Full face tight fitting PAPR with 100 efficiency (HEPA) filters
> 100xPEL	Supplied air respirator SCBA

- Any respirator on the list may be used for a lesser exposure.
- A respirator may only be used if all feasible engineering and administrative controls can not reduce the exposure below the PEL; while verifying engineering and administrative controls are effective in keeping the exposure to below the PEL; or when the exposure is proven to be below the PEL but the team member wants to use a respirator anyway (the team member must be current in Cianbro's respiratory protection program policy and procedure, and be using a NIOSH approved respirator and filters).
- Abrasive blasting (except vacuum blasting) requires type CE pressure demand supplied air blasting hood.

H. Hygiene

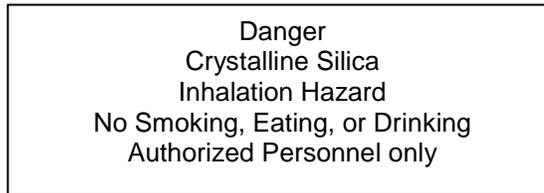
- Good hygiene is as important as PPE in protecting team members from toxic materials. To ensure team members protect themselves and their families, the following practices are required:
 1. Do not eat, drink, or use tobacco products in work areas where silica-containing dust is present.
 2. Wash your hands and face before eating, drinking, or smoking.
 3. Use disposable or washable work clothing at the work site.
 4. Shower if available or change into clean clothing before going home. If work clothing is to be washed, make sure to handle it in such a manner as to not put the dust back into the air. Place it into plastic bags labeled "Caution-clothing contaminated with silica dust".
 5. Provide hand-washing facilities at a minimum.
 6. Park personal vehicles away from sources of silica dust.

I. Regulated Areas

- In operations producing dust containing or suspected of containing crystalline silica, care must be taken to also protect people and places not involved with the work. This may mean blocking off the area (with tape or plastic fencing, etc.) and posting signs or in some cases using containment with ventilation and

HEPA exhaust depending on location and type of work. People without the proper PPE are not allowed in the regulated area. The size of the area should be determined by the competent person based on visible emissions, wind direction, and available sampling data.

- Signs should be posted at all possible access points:



J. Housekeeping

- Areas shall be kept as free from accumulated dust as possible. Use methods that do not reintroduce dust into the air (wet methods, hepavacs, etc.).

K. Medical Surveillance

- All team members with potential exposure to crystalline silica must be current with Cianbro's respirator medical surveillance.
- They must have had the pre-placement physical including the respirator questionnaire (with the silicosis portion)
- A baseline PFT must be done within the first two years of employment
- The respirator and silicosis questionnaires must be completed annually.
- The standard PFT must be performed every three years (FVC, FEV₁, and FEV₁ / FVC).

L. Follow-up examinations are ordered by Cianbro's Medical Director after review of the above information and may be triggered by the following:

- Signs and symptoms of silicosis not explained by any non silica related, currently existing medical condition.
- And/or clinically significant PFT results:
 1. FVC < 70% of predicted.
 2. FEV₁/FVC and FVC < 70% of predicted.
 3. Predicted excessive lung function loss using the Spirola software.
 4. Other change deemed clinically significant by medical review.
- The initial follow up will consist of a silica medical exam and a specialized PFT (DLCO, and /or radiographic TLC). It may include a chest x-ray if clinically indicated and not done as part of specific respiratory function testing. Please contact Cianbro's medical director with any questions.
- In the event that silica induced pulmonary disease is suspected, the team member must be removed from potential exposure to silica containing dusts until a final medical determination is made.

M. Waste Storage and Disposal

- By itself, dust containing crystalline silica is not regulated as a hazardous waste unless it is mixed with or contains something else that makes it a hazardous waste. Make sure that you do not create an additional airborne crystalline silica hazard when collecting, emptying, or disposing of the material.

N. Recordkeeping

- In accordance with 29 CFR 1910.20, medical records shall be maintained for at least thirty years after a team member's termination of employment.
- All exposure monitoring (air sampling, etc.) results shall be kept for thirty years. The results of exposure monitoring shall be reported in writing to the team members it represents or posted in a location available to the team members. Use Cianbro form SD1056 to report the results. If the results are above the PEL, include the actions that will be taken to reduce the exposure.

- All exposure monitoring worksheets, results, and other pertinent information should be kept on site and a copy sent to the HSE Manager.

O. Subcontractors

- All subcontractors of Cianbro Corporation are required to meet or exceed the requirements of this safety policy and procedure when performing work that has the potential for crystalline silica exposure above the PEL.
- All Cianbro subcontractors shall notify Cianbro Corporation of any activity with the potential for crystalline silica exposure and the methods they will employ to control the exposure.
- Cianbro team members performing work that has the potential for crystalline silica exposure to non-Cianbro employees shall, prior to beginning the activity, notify all potentially affected parties of the expected exposure, health hazards of crystalline silica, and the methods they can use to protect themselves against overexposure.
- Each contractor is responsible for the safety of their own workers, whether they create the hazard or not. A contractor is also responsible for its subcontractors. Therefore, control of silica dust must be coordinated effort. No one can say, "It's not my problem." Failure to protect the workers is not a viable option.

7.5 Safety At Home

Activities such as gardening, driving on dirt roads, farming, home construction, wind blown dust, and even kicking up sand on the beach cause crystalline silica to become airborne. Prolonged inhalation of particles too small to be seen can cause serious health problems for people. In activities at home, make sure to prevent ongoing exposure to high levels of dust. Follow the information in this policy to reduce or eliminate exposure to dust containing crystalline silica.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 National Emphasis Program – Crystalline Silica – Directive CPL 03-00-007
 Special Emphasis Program for Silicosis in Construction - 1996
 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists
 NIOSH alert "Preventing Silicosis and Death in Construction Workers"
 See 9.1 Appendix A for other standards that may apply.

TABLE OF APPLICABLE STANDARDS

The following table contains OSHA standards that impact the way we handle hazards related to silica and that may be cited under the right circumstances.

OSHA Requirement	General Industry Standard	Construction Standard	Maritime Standard
Respiratory Protection	1910.134	1910.134	1910.134
Permissible Exposure Limit and Controls	1910.1000	1926.55 & .57	1915.1000
Accident Prevention and Warning Signs	1910.145	1926.200	--
Access To Team member Exposure and Medical Records	1910.20	1926.33	1915.1120
OSHA 200 Forms	1904	1904, 1926.22	1904
Abrasive Blasting, Breathing Air, Enclosures, Controls	1910.94	1926.28, .55, .95, .100, .101, .102, .103, and .300	1915.131, .133, .151, .152, .153, and .1000
Hygiene	1910.141	1926.27 and .51	1915.97
General PPE	1910.132	1926.28, .95, .100 to .105	1915.151 to .154
Hazard Communication	1910.1200	1926.59	1915.1200
Safety and Health Program	--	1926.20	--
General Training	--	1926.21	--

I. Describe each activity emitting lead or silica including the hazardous material(s) and the tools, equipment, and process that create the hazard:

II. List the specific Eng./ Administrative controls and studies reviewed. What controls will be used? What controls are not feasible and why?

1. Ventilation (local/general, positioning, air flow):

2. Shrouded/exhausted tools or local exhaust:

3. Containment (describe):

4. Wet methods (describe how water is used):

5. Other (long handled torches, paint remover, etc.):

6. Administrative controls (team member exposure time log kept for worker rotation, SOP's):

III. Air monitoring history (past/present), list or attach sampling results or other information used to make initial exposure assessment:

IV. Work practice program:

1. Hygiene plans (hand wash at minimum, showers if required, decon procedure):

2. Protective clothing/equipment:

3. Housekeeping plans (wet methods or hepavac):

4. Specific team member responsibilities:

5. Equipment operating procedures:

6. Equipment maintenance practices:

7. Silica Awareness Training:

a. Health Effects (See Appendix C)
b. Steps to Protect Yourself Against Crystalline Silica (See Appendix D)
c. Contents of Site/Task Specific Silica Protection Plan

Competent person must do frequent and regular checks of the work area. For lead work refer to Appendix F, 034 Crystalline Silica Protection Program Policy and Procedure. Notify all other contractors in the area of potential lead exposure related to our work.

Health Effects of Crystalline Silica

Inhaling fine particles of crystalline silica containing dusts has been associated with respiratory disease, most commonly silicosis. Additionally, there is evidence that exposure to crystalline silica-containing dusts causes or is associated with the following conditions: lung cancer, tuberculosis, chronic obstructive pulmonary disease (including emphysema and bronchitis), autoimmune diseases or immunologic disorders, chronic renal disease, and sub clinical renal changes [NIOSH, 2002]. The International Agency for Research on Cancer (IARC) has classified silica as a known human carcinogen (group 1).

When fine particles of crystalline silica enter the lungs and are trapped, the lung tissue reacts by developing fibrotic nodules and scarring around the particles. As exposure continues and the condition worsens, the nodules become progressively larger and breathing becomes increasingly difficult. This fibrotic condition of the lungs is called silicosis and it reduces the lungs ability to extract oxygen from the air. Eventually the worker may even die of respiratory failure. The body's natural defenses (mucous membranes of the nose and throat, etc.) filter out most of the particles above 5-10 microns in size from the air we breathe. Yet there is no mechanism to remove particles small enough to get deep into the lungs; these particles, such as silica, can not be broken down by the body.

The construction industry has a high risk of exposure to crystalline silica containing dusts due to the materials like concrete that we work with and the activities that are typical to the work like demolition. Many of these activities create freshly fractured crystalline silica particles and studies have shown that a worker's lung may react more severely to silica that is freshly fractured.

Symptoms of silicosis may not develop for many years but as the exposure continues symptoms appear such as shortness of breath with exertion (the most common symptom), coughing, and fever due to infectious disease of the lung (such as tuberculosis). Because these symptoms can be caused by a lot of things, silicosis is often misdiagnosed as bronchitis, emphysema, and tuberculosis. It is important however, to accurately identify silicosis, as the disease can only be stopped, not cured!

NIOSH has classified three types of silicosis:

- Chronic Silicosis, which occurs after ten or usually more years of exposure to crystalline silica at relatively low concentrations.
- Accelerated Silicosis, which results from exposure to high concentrations of crystalline silica and develops five to ten years after the initial exposure.
- Acute Silicosis, which occurs where exposure concentrations are the highest and can cause symptoms to develop within a few weeks to four or five years after the initial exposure.

Not everyone will contract silicosis at the same rate if at all. The development of silicosis will depend on the following factors:

- Particle size: when the silica crystals are broken down into dust sized or respirable particles (smaller than 10 microns) they are small enough to be inhaled deep into the lungs and become deadly.
- Percentage of crystalline silica: the higher the percentage of crystalline silica present that is small enough to get deep into the lungs, the more damage that will occur.
- Length of exposure: the longer a person is exposed to respirable crystalline silica, the more likely they are to develop silicosis.
- Severity of exposure: the higher the concentration a person is exposed to the more likely they are to develop silicosis.
- Individual susceptibility: certain individuals will be more prone to develop silicosis and its associated complications due to the person's health.

Smoking: smoking increases a person's chance to contract silicosis by inhibiting the ability to filter particles out of the air before they reach the lungs.

Steps to Protect Yourself from Crystalline Silica

Take the following steps to protect yourself against exposure to crystalline silica:

- Know the health effects of crystalline silica and that smoking adds to the damage.
- Participate in any medical surveillance, air monitoring, or training programs offered.
- Substitute less hazardous materials and/or methods.
- If substitution is not possible, use engineering controls such as dust collectors, wet methods, and local exhaust ventilation to minimize exposures to silica containing dust.
- Always use dust control systems when available and keep them well maintained.
- Use wet methods whenever possible.
- Be aware that the highest silica concentrations may occur inside enclosed areas during concrete or masonry sawing or abrasive blasting.
- Change into disposable or washable work clothes at the jobsite.
- Do not eat, drink, use tobacco, or apply cosmetics in dusty areas.
- Wash hands and face before eating, drinking, or smoking outside dusty areas.
- Shower, if possible, and change into clean clothes before leaving the jobsite.
- Park in a location away from dusty operations, preferably upwind.
- Use type CE pressure demand abrasive blasting respirators when abrasive blasting.
- When cleaning up or disposing of silica containing materials, use a method that does not reintroduce dust into the air.

SAFETY DATA SHEET

1. Identification

Product identifier: QUARTZ

Other means of identification
Product No.: 3382, 7062

Recommended use and restriction on use

Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer

Company Name: Avantor Performance Materials, Inc.
Address: 3477 Corporate Parkway, Suite 200
 Center Valley, PA 18034
Telephone: Customer Service: 855-282-6867
Fax:
Contact Person: Environmental Health & Safety
e-mail: info@avantormaterials.com

Emergency telephone number:
 24 Hour Emergency: 908-859-2151

Chemtec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Health hazards

Carcinogenicity	Category 1A
Specific target organ toxicity - repeated exposure	Category 1

Label elements

Hazard symbol:



Signal word: Danger

Hazard statement: May cause cancer.
 Causes damage to organs through prolonged or repeated exposure.

Precautionary statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe dust/fume/gas/mist/vapors/spray. Wash hands thoroughly after handling. Do not eat, drink or smoke when using this product.

Response: IF exposed or concerned: Get medical advice/attention. Get medical advice/attention if you feel unwell.

Storage: Store locked up.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

Substances

Chemical identity	Common name and synonyms	CAS number	Content in percent (%)*
QUARTZ		14808-60-7	90 - 100%

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

Ingestion: Rinse mouth thoroughly. Call a POISON CENTER or doctor/physician if you feel unwell.

Inhalation: Move to fresh air. Get medical attention if symptoms persist.

Skin contact: Wash skin thoroughly with soap and water. Get medical attention if irritation persists after washing. Wash contaminated clothing before reuse.

Eye contact: Flush thoroughly with water. If irritation occurs, get medical assistance.

Most important symptoms/effects, acute and delayed

Symptoms: May cause irritation to skin, eyes, and respiratory tract.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

Unsuitable extinguishing media: None known.

Specific hazards arising from the chemical: During fire, gases hazardous to health may be formed.

Special protective equipment and precautions for firefighters

- Special fire fighting procedures:** Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.
- Special protective equipment for fire-fighters:** Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

6. Accidental release measures

- Personal precautions, protective equipment and emergency procedures:** Keep unauthorized personnel away. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment.
- Methods and material for containment and cleaning up:** Sweep up and place in a clearly labeled container for chemical waste. Clean surface thoroughly to remove residual contamination.
- Notification Procedures:** Prevent entry into waterways, sewer, basements or confined areas. Inform authorities if large amounts are involved.
- Environmental precautions:** Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

- Precautions for safe handling:** Use personal protective equipment as required. Avoid contact with eyes, skin, and clothing. Avoid inhalation of dust. Wash thoroughly after handling. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/protective clothing/eye protection/face protection.
- Conditions for safe storage, including any incompatibilities:** Keep containers tightly closed. Store in cool, dry place. Store in a well-ventilated place. Store locked up.

8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Chemical identity	Type	Exposure Limit values	Source
QUARTZ - Respirable fraction.	TWA	0.025 mg/m ³	US. ACGIH Threshold Limit Values (2011)
QUARTZ - Respirable dust.	REL	0.05 mg/m ³	US. NIOSH: Pocket Guide to Chemical Hazards (2010)
	TWA	0.1 mg/m ³	US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)
QUARTZ - Respirable.	TWA	2.4 millions of particles per cubic foot of air	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)
	TWA	0.1 mg/m ³	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)
QUARTZ - Total dust.	TWA	0.3 mg/m ³	US. OSHA Table Z-3 (29 CFR 1910.1000) (2000)

- Appropriate engineering controls** No data available.

Individual protection measures, such as personal protective equipment

General information:	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.
Eye/face protection:	Use tight fitting goggles if dust is generated.
Skin protection	
Hand protection:	Wear protective gloves.
Other:	Wear suitable protective clothing.
Respiratory protection:	In case of inadequate ventilation use suitable respirator.
Hygiene measures:	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Provide eyewash station and safety shower.

9. Physical and chemical properties
--

Appearance

Physical state:	Solid
Form:	Granules
Color:	Off-white
Odor:	Odorless
Odor threshold:	No data available.
pH:	No data available.
Melting point/freezing point:	1,710 °C
Initial boiling point and boiling range:	2,230 °C
Flash Point:	Not applicable
Evaporation rate:	No data available.
Flammability (solid, gas):	Noncombustible Solid
Upper/lower limit on flammability or explosive limits	
Flammability limit - upper (%):	No data available.
Flammability limit - lower (%):	No data available.
Explosive limit - upper (%):	No data available.
Explosive limit - lower (%):	No data available.
Vapor pressure:	Estimated < 0.01 kPa (25 °C)
Vapor density:	No data available.
Relative density:	2.65 (20 °C)
Solubility(ies)	
Solubility in water:	Insoluble in water
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Auto-ignition temperature:	No data available.
Decomposition temperature:	No data available.
Viscosity:	No data available.
Other information	
Molecular weight:	60.08 g/mol (O2Si)

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10. Stability and reactivity

Reactivity:	No dangerous reaction known under conditions of normal use.
Chemical stability:	Material is stable under normal conditions.
Possibility of hazardous reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Excessive heat. Contact with incompatible materials.
Incompatible materials:	Alkalies. Strong oxidizing agents. Fluorine.
Hazardous decomposition products:	None known.

11. Toxicological information

Information on likely routes of exposure

Ingestion:	May be harmful if swallowed.
Inhalation:	May be harmful if inhaled.
Skin contact:	May cause irritation.
Eye contact:	May cause irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral	
Product:	No data available.
Dermal	
Product:	No data available.
Inhalation	
Product:	No data available.
Repeated dose toxicity	
Product:	No data available.
Skin corrosion/irritation	
Product:	May cause skin irritation.
Serious eye damage/eye irritation	
Product:	May irritate eyes.
Respiratory or skin sensitization	
Product:	Not a skin sensitizer.
Carcinogenicity	
Product:	May cause cancer.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

QUARTZ Overall evaluation: 1. Carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

QUARTZ Known To Be Human Carcinogen.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050):

No carcinogenic components identified

Germ cell mutagenicity

In vitro

Product: No mutagenic components identified

In vivo

Product: No mutagenic components identified

Reproductive toxicity

Product: No components toxic to reproduction

Specific target organ toxicity - single exposure

Product: No data available.

Specific target organ toxicity - repeated exposure

Product: Lung

Aspiration hazard

Product: Not classified

Other effects:

None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Chronic hazards to the aquatic environment:

Fish

Product: No data available.

Aquatic invertebrates

Product: No data available.

Toxicity to Aquatic Plants

Product: No data available.

Persistence and degradability

Biodegradation

Product: There are no data on the degradability of this product.

BOD/COD ratio

Product: No data available.

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Bioaccumulative potential

Bioconcentration factor (BCF)

Product: No data available on bioaccumulation.

Partition coefficient n-octanol / water (log Kow)

Product: No data available.

Mobility in soil: No data available.

Other adverse effects: The product components are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

13. Disposal considerations

Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws. Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT
Not regulated.

IMDG
Not regulated.

IATA
Not regulated.

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
None present or none present in regulated quantities.

Superfund amendments and reauthorization act of 1986 (SARA)

Hazard categories

Acute (Immediate) Chronic (Delayed) Fire Reactive Pressure Generating

SARA 302 Extremely hazardous substance
None present or none present in regulated quantities.

SARA 304 Emergency release notification
None present or none present in regulated quantities.

SARA 311/312 Hazardous chemical

Chemical identity	Threshold Planning Quantity
QUARTZ	500 lbs

SARA 313 (TRI reporting)

None present or none present in regulated quantities.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)

None present or none present in regulated quantities.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):

None present or none present in regulated quantities.

US state regulations

US. California Proposition 65

QUARTZ Carcinogenic.

US. New Jersey Worker and Community Right-to-Know Act

QUARTZ Listed

US. Massachusetts RTK - Substance List

QUARTZ Listed

US. Pennsylvania RTK - Hazardous Substances

QUARTZ Listed

US. Rhode Island RTK

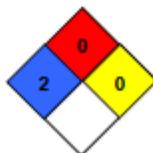
No ingredient regulated by RI Right-to-Know Law present.

Inventory Status:

Australia AICS:	On or in compliance with the inventory
Canada DSL Inventory List:	On or in compliance with the inventory
EINECS, ELINCS or NLP:	On or in compliance with the inventory
Japan (ENCS) List:	On or in compliance with the inventory
China Inv. Existing Chemical Substances:	Not in compliance with the inventory.
Korea Existing Chemicals Inv. (KECI):	On or in compliance with the inventory
Canada NDSL Inventory:	Not in compliance with the inventory.
Philippines PICCS:	On or in compliance with the inventory
US TSCA Inventory:	On or in compliance with the inventory
New Zealand Inventory of Chemicals:	On or in compliance with the inventory
Japan ISHL Listing:	On or in compliance with the inventory
Japan Pharmacopoeia Listing:	Not in compliance with the inventory.

16. Other information, including date of preparation or last revision

NFPA Hazard ID



Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date: 09-09-2014
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Revision date: No data available.

Version #: 1.0

Further information: No data available.

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Policy Number: 035**Authorized By:** Michael W. Bennett**Title:** Work Zone Traffic Control**Effective Date:** 12/01/98Page 1 of 10

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To establish traffic control plans which provide the best protection for team members exposed to the hazards of working around vehicle traffic involving the traveling public.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 ATSSA: American Traffic Safety Services Association.
- 4.2 Attenuator: An impact attenuator, also known as a crash cushion or crash attenuator, is a device intended to absorb the energy of a crash. Types of attenuators include a plastic barrel filled with sand, usually yellow colored with a black lid or truck mounted versions which can be deployed on vehicles that are prone to being struck from behind, such as road construction or maintenance vehicles.
- 4.3 MUTCD (Manual of Uniform Traffic Control Devices): The MUTCD contains the national standards governing all traffic control devices. All public agencies across the nation rely on the MUTCD to bring uniformity to the roadway. The MUTCD plays a critical role in improving safety and mobility of all road users. The MUTCD is the law governing all traffic control devices. Non-compliance of the MUTCD ultimately can result in loss of federal-aid funds. The current edition is dated 2003 and is in the process of changes to be published sometime in 2009.
- 4.4 Temporary Traffic Control Zone (TTCZ): An area of a highway where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.
- 4.5 Traffic Control: Traffic control is a process of advising motorist of requirements or conditions affecting road use at specific places so that proper action may be taken and accidents or delays avoided. Work site traffic control applies to maintenance and construction requirements or other special temporary conditions affecting road use at specific places and times.

- 4.6 Traffic Control Device (TCD) A sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction. They are used to regulate, warn, and guide motorist and pedestrians through or around the work site safely, efficiently and satisfy the following requirements:
- Fulfill a need
 - Command attention
 - Convey a clear and simple meaning
 - Command respect of road users
 - Permit adequate time for response
- 4.7 Traffic Control Plan (TCP): A traffic control plan is a plan for handling traffic through a specific highway, street work zone or project. These plans may range in scope from a very detailed TCP designed solely for a specific project, to a reference to standard plans, a section of the manual on uniform traffic control devices (MUTCD), or a standard highway agency manual. The degree of detail in the TCP will depend on the project complexity and traffic interference with construction activity.
- 4.8 Traffic Control Zone (TCZ): A traffic control zone is the entire area of the roadway which encompasses all traffic control devices used to regulate, warn or guide motorists' behavior. Such a zone must be inspected after the traffic control plan has been implemented to insure that the zone has not unexpectedly expanded to include other streets adjacent to the zone.
- 4.9 Variable Message Sign (VMS) or Changeable Message Sign: A sign that is capable of displaying more than one message, change manually, by remote control, or by automatic control. Normally, these signs are trailer able, powered by either a gasoline or diesel engine or by batteries using solar panels. They are generally used to display changes in traffic conditions or for announcements.
- 4.10 Work Zone: The area itself that is set apart and delineated for use by workers to include the machinery and supplies needed to perform the immediate operation.

5 Policy

- 5.1 All work in vehicular traffic zones shall be performed behind physical barriers.

6 Responsibilities

- 6.1 Cianbro is responsible to provide sound principles of safety, training, inspection, maintenance, application and operations consistent with all resource data available from the manufacturer, OSHA and ANSI.
- 6.2 Project Management is responsible for the implementation and execution of these standards.
- 6.3 The safety of all personnel in and around the vehicles is dependent on safe use and operation by the operator.
- 6.4 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for deviations from this policy.
- 6.5 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.6 The corporate safety department is responsible for maintaining this document.

7 Work Zone Traffic Control Index

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7.1 Project Specific Traffic Control Plan

Project specific traffic control plans shall provide the best protection for the:

- Work force
- Motorist (traveling public)
- Pedestrians
- Equipment
- Facilities
- Emergency Personnel

7.2 Traffic Control Plan

- Site specific written traffic control plans shall be developed for all work activities which involve working within 15' from the outside shoulder edge of all public and private ways where the traveling public are driving vehicles. These plans may be incorporated into Cianbro's activity plans or on a separate attachment. The plan must be specific, to address all hazards and should include drawings which detail locations of traffic control devices, controlled access ways, team member/equipment parking, etc. Site specific traffic control plans should be owner approved, per the written contract, if applicable.
- Work zone traffic control plans developed shall at a minimum follow the guidelines developed in part VI of the Manual on Uniform Traffic Control Devices (MUTCD) and any applicable state or local standards.
- A competent individual at each work location shall be identified in all plans and be responsible to ensure plans are established, followed and maintained for the duration of the work being performed.

7.2.1 Police support - Police support, when possible, will be used to set up traffic control systems/devices and will be present during time of ongoing and/or special hazard sensitive situations if determined by the competent person responsible for plan approvals. It is especially important that police support is provided when establishing significant/major long-term traffic control pattern changes with barriers and devices.

7.2.2 Competent/Certified person – All traffic control plans shall be reviewed and approved by competent/certified person prior to the start of the activities. All plan changes will also require the review and approval by the ATSSA trained supervisor.

7.3 Work Site Vehicle Use

7.3.1 Barrier vehicles

Specially equipped Cianbro vehicles (rack truck, or other truck) will be used as a barrier between on coming traffic and workers when other solid mass type barrier devices are not feasible. Vehicles should be offset at least four feet from workers into traffic. Trucks equipped with attenuators in excessive speed zone areas, will have flashing arrow boards, traffic control checklist for reference, storage compartment for traffic vests, etc. and a supply of traffic cones in the back bed of the truck. The style type and size of the attenuators used shall be specified for the posted traffic speed. Depending on the traffic control plan (TCP) some truck mounted attenuators (TMA) require that the driver must have a CDL license. Drivers and passengers shall exit and enter the vehicle from the

opposite side of moving traffic. When possible, use trucks having a crew cab so that both doors on the opposite side of traffic is used to expedite traffic setups and pick up of traffic control (personal and work crews). Wheel chocks shall be positioned under the curbside wheels when needed. Avoid working from the rear of traffic control truck when setting out or picking up the traffic control devices.

7.3.2 Personal vehicles

- The use of team member personal vehicles must be restricted as much as possible. Off road parking areas should be identified and included in activity plans and areas located such that team members are not required to walk across traffic to access work areas. Should it be absolutely necessary to use personal vehicles as a last resort they must be pulled off the roadway as far as possible into the shoulders, put flashers on, turn vehicle off, in gear, with brakes on. Exit/enter vehicle on shoulder side when possible or skew so that no part of the open door is in the traffic lane. Immediately utilize the provided barrier protection devices in the work areas.
- Multiple lane closures may require more specific planning considerations of these issues for the safest alternatives.

7.4 Roadway Crossing for Workers (TMs)

- When no other options are feasible and team members (other workers, visitors, owner reps etc.) have to cross an active roadway, as few as necessary designated crossing points shall be identified and used. Crosswalk striping of roadway done, flashing lights placed at both sides of the road at the entry of the crosswalk with buttons/switches that can be activated as needed before crossing whenever possible. Signs posted for crosswalk. Only cross road when there is significant time to safely walk across the road. A distance marker/post can be out to estimate oncoming vehicle speed for safe crossing.
- State, federal or local jurisdiction approval may be required to establish specific crosswalks for workers.

7.5 Flaggers

The use of flaggers is prohibited unless approved by the competent/certified person in the control of slow moving traffic only, as defined in the (M.U.T.C.D). In addition, flaggers must be protected by barriers if it is feasible. All flaggers must be trained in accordance with M.U.T.C.D. standards or state required laws. Some owner/client contracts may call for the use of flaggers in those cases alternative measures should still be considered if feasible, and changed with the owner's approval. Cianbro prefers to use subcontractors who specialize in traffic control when possible rather than Cianbro team members.

7.6 Training

7.6.1 ATSSA trained supervisor

ATSSA trained supervisor shall have more than two years experience and be certified by the American Traffic Safety Services Association (ATSSA) or equivalent certifying body.

7.6.2 Project competent person

Competent person designated to develop traffic control plans, establish traffic control patterns and monitor operations may or may not be the safety specialist, but someone who has the knowledge of traffic control processes experience, training and the ability to recognize hazardous conditions and has the authority to take corrective actions.

7.6.3 Truck/vehicle drivers

- All Cianbro classified truck drivers shall receive site specific traffic control training in routing driving operations in and around traffic control zones.
- Other truck/vehicle drivers assigned to operate at a project in traffic control zones shall receive a minimum of 2 hours of job specific traffic control training.

7.6.4 Project team member training

All Cianbro team members who are required to work in and around traffic control zones shall receive site specific training. The training must include instruction on how to work in traffic safely, high-visibility apparel requirements (all team members are required to wear Type II or Type III high-visibility safety vests when in the work zone), the proper order for installation and removal of traffic control devices, and the potential consequences of improper device installation. This training must be updated when conditions change and include as a minimum those hazards identified in activity plans and site specific traffic control documents.

7.6.5 Other training

- Project management shall ensure that all subcontractors and other persons working or present in a traffic control zone/work areas are given traffic control awareness training specific to their jobsite.
- General traffic control training will be incorporated into Cianbro's regular training programs like the 30 hours OSHA outreach program.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents and References

- 9.1 See attachments for related documents

9.2 Related References

- Manual on Uniform Traffic Control Devices (MUTCD) 2003 (Next Edition in 2009) (Electronic Version Online: www.mutcd.fhwa.dot.gov/)
- American Association of State Highways and Transportation Officials (AASHTO)
- Institute of Transportation Engineers (ITE)
- Standard Highways Signs (SHS) 2004
Electronic Version from FHWA on the MUTCD Web site (see 9.3)
Hard Copy Version from ATSSA (see 9.8)
- Federal Highway Administration (FHWA)
- American Traffic Safety Services Association (ATSSA) (www.atssa.com)
(Offer classes in Traffic Control Supervision Certifications and Flagger Certification)
- U.S. Road Symbol Signs; Publication No. FHWA- OP- 02- 084
- Highlights of Major Changes to the 2003 MUTCD Publication No. FHWA-HOP- 4- 042
- Quality Standards for Work Zone Traffic Control Devices – (Contact ATSSA)

Suggested Guidelines for TMA Barrier Vehicle Placement					
		Max. Distance from TMA to the end of a work area			
Speed M.P.H.	Min. Distance from TMA to work area	Max. Distance on Tangents	Max. Curves	Max. On/Off Ramp Areas	Max. Traffic Back Up Area
25	35'	50'	45'	40'	25'
30	35'	60'	50'	50'	30'
35	35'	70'	60'	60'	35'
40	50'	80'	70'	70'	40'
45	50'	90'	80'	80'	45'
50*	75' *	100' *	90' *	90' *	50' *
55	75'	110'	90'	90'	55'
60	100'	120'	110'	110'	60'
65	100'	130'	110'	110'	65'
70	100'	140'	110'	110'	70'
75	100'	150'	110'	110'	75'
80	100'	160'	110'	110'	80'

Notes:

- (1.) * For Speeds 50 mph or greater it is recommended that a second traffic control vehicle is placed after the crew working in front of the TMA to keep traffic from entering the work area once they pass the TMA. The number and spacing of traffic cones or barrels between the TMA barrier vehicle thru the work area to the second traffic control vehicle should be doubled this will also help prevent vehicles from entering the work area.
- (2.) This Guideline is for TMA Barrier Vehicles weighting 24,000 lbs. or more.
- (3.) While working in the areas where there are On/Off Ramps special care needs to be taken. The distance from the TMA to the work area may need to shorten because of vehicles trying to cross in front of the TMA and thru the work area to reach the Off Ramp or enter from an On Ramp. Cone and Barrel spacing should be closer in the On/Off Ramp areas.
- (4.) Traffic back ups may occur, when this happens it may be necessary to shorten the distance from the TMA to the work area and add more cones or barrels to tighten up the space between them to prevent vehicles from entering the work area.

Computed Roll-Ahead Distances for Protective Vehicles

Vehicle Weight (lb)	Prevailing Speed (mph)	Weight of Impacted Vehicle to be Contained (a)			
		4,500 lb (in ft)	10,000 lb (in ft, [c])	15,000 lb (in ft)	24,000 lb (in ft)
Protection Moving Vehicle					
10,000	60-65	100	175[c]	225	275
	50-55	100	150[c]	175	200
	45 or less	75	100[c]	125	150
15,000	60-65	75	150	175	225
	50-55	75	125	150	175
	45 or less	50	100	100	100
24,000	60-65	75	100	150	175
	50-55	50	75	100	150
	45 or less	50	75	75	100
Barrier Vehicle (Stationary)					
10,000	60-65	50	100[c]	150	200
	60-66	25	75[c]	100	150
	60-67	25	50[c]	75	100
15,000	60-65	25		75	100
	50-55	25	50	75	100
	45 or less	25	50	50	75
24,000	60-65	25	50	75	100
	50-55	25	25	50	75
	45 or less	25	25	25	50

Notes:

[A] Weights of typical vehicles: mid-size auto, 2,250 lb; full-size auto, 3,500 lb; loaded ¾ ton pickup truck, 6,000 lb; loaded 1 ton cargo truck, 10,000 lb; loaded 4 yard dump truck 24,000 lb.

[B] Distances are appropriate for shadow vehicle speeds up to 15 mph.

[C] Values suggested as the appropriate buffer distance for vehicles equipped with TMA's.

Sources:

J.B. Humphreys and T.D. Sullivan, "Guidelines for the use of Truck-Mounted Attenuators," Proceedings of the Symposium on Work Zone Traffic Control, Federal Highway Administration, June 1991.

Flagger Control

Qualifications for Flaggers: Most states require a flagger to be certified. Look into what is required for your project.

A flagger shall be a person who provides Temporary Traffic Control (TTC).

Guidance: Because flaggers are responsible for public safety and make the greatest number of contacts with the public of all highway workers, they should be trained in safe traffic control practices and public contact techniques. Flaggers should be able to satisfactorily demonstrate the following abilities:

- A. Ability to receive and communicate specific instructions clearly, firmly, and courteously;
- B. Ability to move and maneuver quickly in order to avoid danger from errant vehicles;
- C. Ability to control signaling devices (such as paddles and flags) in order to provide clear and positive guidance to drivers approaching a TTC zone in frequently changing situations;
- D. Ability to understand and apply safe traffic control practices, sometimes in stressful or emergency situations; and
- E. Ability to recognize dangerous traffic situations and warn workers in sufficient time to avoid injury.

Note: Signaling with a Flag is not allowed by Cianbro. A stop/slow paddle must be used.

Flagger Stations: Flagger stations shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.

Stopping Sight Distance as a Function of Speed

Speed* (mph)	Distance (ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

Standard:

* Except in emergency situations, flagger stations shall be preceded by an advance warning sign.

* Except in emergency situations, flagger stations shall be illuminated at night.

Guidance:

The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. Whenever feasible a barrier must be provided. A flagger should only stand in the lane being used by moving road users after road users have stopped. The flagger should be clearly visible to the first approaching road user at all times. The flagger also should be visible to other road users. The flagger should be stationed sufficiently in advance of the workers to warn them (for example, with audible warning devices such as horns or whistles) of approaching danger by out-of-control vehicles. The flagger should stand alone, never permitting a group of workers to congregate around the flagger station.

Option:

At a spot constriction, the flagger may have to take a position on the shoulder opposite the closed section in order to operate effectively.

Policy Number: 036**Authorized By:** Michael W. Bennett**Title:** Lyme disease and West Nile Virus**Effective Date:** 01/01/99Page 1 of 8

1 Status

1.1 Update of existing policy, effective 12/04/14.

2 Purpose

2.1 Understanding the health hazards for both Lyme disease and West Nile from prevention to risk areas to symptoms and treatment.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 CDC: Center for Disease Control.

4.2 West Nile Encephalitis: Inflammation of the brain caused from the West Nile virus and is transmitted by the bite of infected mosquitoes.

4.3 WNV: West Nile Virus.

5 Policy

5.1 Team members, subcontractors, and others in our control, will follow all requirements of this policy and procedure.

6 Responsibilities

6.1 Corporate Safety is responsible for maintaining this document.

7 Lyme disease and West Nile Index

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7.1 Lyme Disease Transmission

Lyme disease is transmitted through the bite of an infected blacklegged tick (also known as a deer tick) which spreads the disease in the northeastern, mid-Atlantic, and north-central United States, as well as the Pacific Coast. Ticks can attach to any part of the human body and in most cases must be attached for 36-48 hours or more before the disease can be transmitted. Most humans are infected through the bites of immature ticks called nymphs which are tiny (less than 2mm) and difficult to see. Nymphs feed during the spring and summer months. Adult ticks also transmit Lyme disease but they are much larger and are more likely to be discovered and removed before they have time to transmit the bacteria. Adult ticks are most active during the cooler months.

7.2 Determining Risk of Lyme Disease

Team members are at risk for Lyme disease when working in moist, shaded, wooded and bushy areas with high grass and leaf litter when the temperature is 38 degrees or warmer. Take extra precautions in the warmer months (April – September). This is when ticks that transmit Lyme disease are most active. Contact state and local health authorities to determine the risk in your location and/ or reference the map of reported cases in Appendix A.

7.3 Identifying Deer Ticks

The Deer tick, as shown in the picture to the right, can sometimes be confused with other tick species. If you need help in tick identification, please refer to the University of Rhode Island’s tick identification website by clicking the following link:

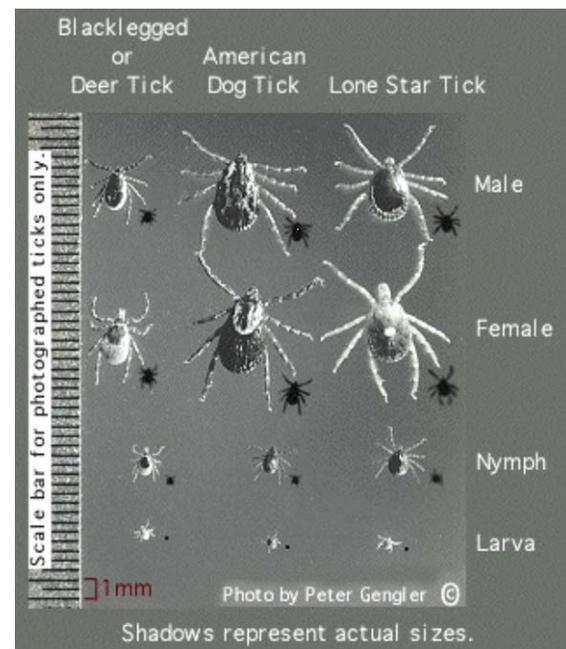
http://www.tickencounter.org/tick_identification.

7.4 Symptoms and Signs of Lyme disease

Early detection and treatment of Lyme disease is crucial. Don’t take any chances; consult with a physician if any of the following symptoms are experienced.

7.4.1 Early localized stage symptoms and signs (3 – 30 days post-tick bite)

- Expanding rash – solid red or “bulls eye” rash, occurs in approximately 70-80% of infected people and begins at the site of the bite. The rash gradually expands over a period of several days, and can reach up to 12 inches across. Parts of the rash may clear as it enlarges resulting in a “bulls-eye” appearance. Rash usually feels warm to the touch but is rarely itchy or painful.
- Fatigue



- Chills
- Fever
- Headache / muscle and joint aches
- Swelling of lymph glands (nodes) near site of bite

7.4.2 Early disseminated Stage (days to weeks post-tick bite)

- Additional “bulls eye” rash may occur in other areas of the body
- Facial or Bell’s Palsy (loss of muscle tone on one or both sides of the face)
- Severe headaches and neck stiffness due to meningitis (inflammation of the spinal cord)
- Pain and swelling in the large joints (such as knees)
- Shooting pains that may interfere with sleep
- Heart palpitations and dizziness due to changes in heartbeat

7.4.3 Late disseminated stage (months to years post-tick bite)

- 60% of people with untreated infection may have intermittent stints of arthritis with severe joint pain and swelling.
- 5% of people with untreated infection may develop chronic neurological symptoms such as shooting pains, numbness or tingling in the hands or feet, and problems with short-term memory.

Note: There are other diseases carried by ticks. If any kind of tick has bitten you report it to your supervisor and watch for and report any unexplained symptoms.

7.5 Prevention of Tick Bites

Ticks do not jump or fly. Direct contact is the only way you acquire a tick. **The risk of being bitten by a tick can be reduced by taking some or all of the following precautions:**

- The most important way to protect yourself is to remove a tick before it has a chance to transmit the disease. Do a final, full-body tick check at the end of the day. Inspect all parts of your body carefully including your armpits, in and around the ears, belly button, behind the knees, scalp, and groin (remember that some ticks are only the size of a poppy seed).
- Remove leaf litter, clear tall grass, brush, and piles of wood etc. on the jobsite whenever possible.
- Avoid tick habitats. Stay on cleared, well-traveled paths and areas whenever possible. Avoid sitting directly on the ground or on stonewalls.
- Clothing-only repellents that contain Permethrin are very effective and provide long-lasting protection. This, in combination with a skin repellent containing DEET (20 to 30%), is the best protection you can achieve. **Read labels and SDS. Follow all manufacturers’ guidelines carefully. Do not use Permethrin on exposed skin.**
- Ticks start low and crawl up. By tucking pant legs into socks or taping the area where your pants and socks meet, you can prevent ticks from crawling under your clothes.
- Wear a hat and light colored clothing with a tight weave so ticks can be more easily spotted.
- Scan clothes and exposed skin frequently for ticks while outdoors.
- To kill ticks that you may have missed, tumble clothes in a dryer on high heat for at least one hour.
- Insecticide application in tick inhabited areas. There are several insecticides that can be used to treat an infested area from granules, fogs and sprays. As you would with any other chemical products follow the manufactures guidelines. Be sure to check on any local state and federal guidelines before administering any insecticide.
- Bathe or shower as soon as possible after coming indoors (preferably within two hours) to wash off and more easily find ticks that are crawling on you. However, this should not be a replacement for a full body check.

7.6 Tick Removal

If you do find a tick attached to your skin, don’t panic. Not all ticks are infected, and studies of infected deer ticks have shown that they begin transmitting Lyme disease on average of 36 to 48 hours after attaching to the skin. Therefore, your chances of contracting the disease are greatly reduced if you remove a tick within the first 24 hours. Remember, the vast majority of early Lyme disease cases are easily treated and cured. If you are unsure of what kind of tick you have removed, follow the link contained in Section 7.3 above. If you want to have the deer

tick that you removed tested for Lyme, please visit the following link for more information:
http://www.tickencounter.org/tick_testing.

Note: Please refer to Appendix D for step-by-step instructions on proper tick removal.

Monitor yourself for any of the symptoms listed in section 7.4. If these or any other unexplained symptoms develop, report it and see a physician immediately.

Report all tick bites to your supervisor. Supervisors, be sure to complete a First Report on all bites.

7.7 West Nile Virus

West Nile virus (WNV) is most often spread to humans from the bite of an infected mosquito. Team members are at risk for WNV in all areas that we currently work, particularly during the months of June thru September.

7.8 Prevention

Preventing mosquito bites will prevent the West Nile virus infection. Team members should take the following precautions to protect themselves and their families:

- A. If possible, stay indoors at dawn and dusk, when mosquitoes are most active.
- B. When weather permits, wear long sleeved shirts and pants whenever you are outdoors.
- C. Apply insect repellent to exposed skin and to thin clothing. Products with 20 to 30% DEET may be applied to skin and repellent containing Permethrin can be applied to clothing only (Permethrin will continue to repel and kill insects after several washings). **Always follow the manufacturer's "Directions for Use" as printed on the product.** Never use Permethrin on your skin.
- D. Make sure you have good screens on your windows and doors.
- E. Mosquitoes lay their eggs in standing water. Limit the number of places around your jobsite or home for mosquitoes to breed by getting rid of items that hold water.

Examples:

- Old tires, drums, pails, containers etc. that can hold water.
- Drill holes in the bottom of recycling containers and trash cans to drain water.
- Don't let water accumulate in secondary containment, wheelbarrows, boats, toys, birdbaths, pools, etc.
- Eliminate standing water on the ground. In warm weather, mosquitoes can breed in any puddle of water.

7.9 Symptoms and Signs of West Nile Virus

Most people (70-80%) who become infected do not develop any symptoms.

West Nile Fever

About 20 percent of the people who become infected will develop West Nile fever. Symptoms include fever, headache, body aches, joint pains, vomiting, diarrhea or rash. Most people with this type of WNV disease recover completely, but fatigue and weakness can last for weeks or months.

Severe Symptoms Less than 1% of people infected with WNV will develop a serious neurologic illness such as encephalitis or meningitis (inflammation of the brain or surrounding tissues). The severe symptoms can include high fever, headache, neck stiffness, disorientation, coma, tremors, seizures or paralysis. These symptoms may last several weeks and some of the neurological effects may be permanent.

People over 50 or those with certain medical conditions such as cancer, diabetes, hypertension and kidney disease are at greater risk for serious illness and should take special care to avoid mosquito bites.

7.10 Treatment

In more severe cases, people usually need to go to the hospital where they can receive supportive treatment including intravenous fluids, help with breathing and nursing care.

If you think that you have the virus keep in mind that milder WNV illness improves on its own, and people do not necessarily need to seek medical attention for this infection though they may choose to do so. If you develop symptoms of severe WNV illness, such as unusually severe headaches or confusion, seek medical attention immediately. Severe WNV illness usually requires hospitalization. Pregnant women and nursing mothers are encouraged to talk to their doctor if they develop symptoms that could be WNV.

7.11 Report Dead Birds to Local Authorities

Dead birds may be a sign that West Nile virus is circulating between the birds and the mosquitoes in that area.

The public can play an important role in monitoring West Nile virus through reporting dead birds to state and local health departments. States have different policies for collecting and testing birds.

Go to <http://www.cdc.gov/mmwr/international/relres.html> to find out how to report dead birds in your area. If you find a dead bird: Don't handle the body with your bare hands. Your local health department will give you instructions on reporting and disposing of the body.

For more information go to www.cdc.gov or call the CDC at (800) 232-4636

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents and References

- 9.1 See attachments for related documents.

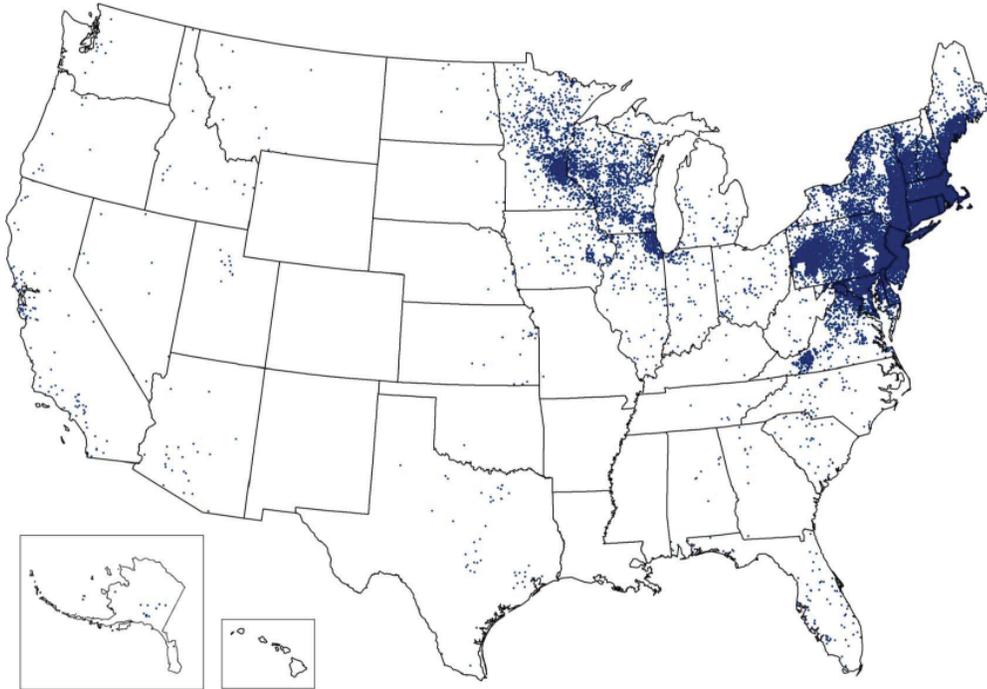
9.2 References

Pictures and info used in this Safety Policy and Procedure are from:

- Department of Entomology, Univ. of Nebraska-Lincoln web site, Jim Kalisch
- John VanDyk, Iowa State University web site
- Centers for Disease Control and Prevention web site (CDC)
- The University of Rhode Island Tick Encounter Resource Center

Reported Cases of Lyme Disease—United States, 2013

One dot is placed randomly within the county of residence for each confirmed case. Though Lyme disease cases have been reported in nearly every state, cases are reported based on the county of residence, not necessarily the county of infection.

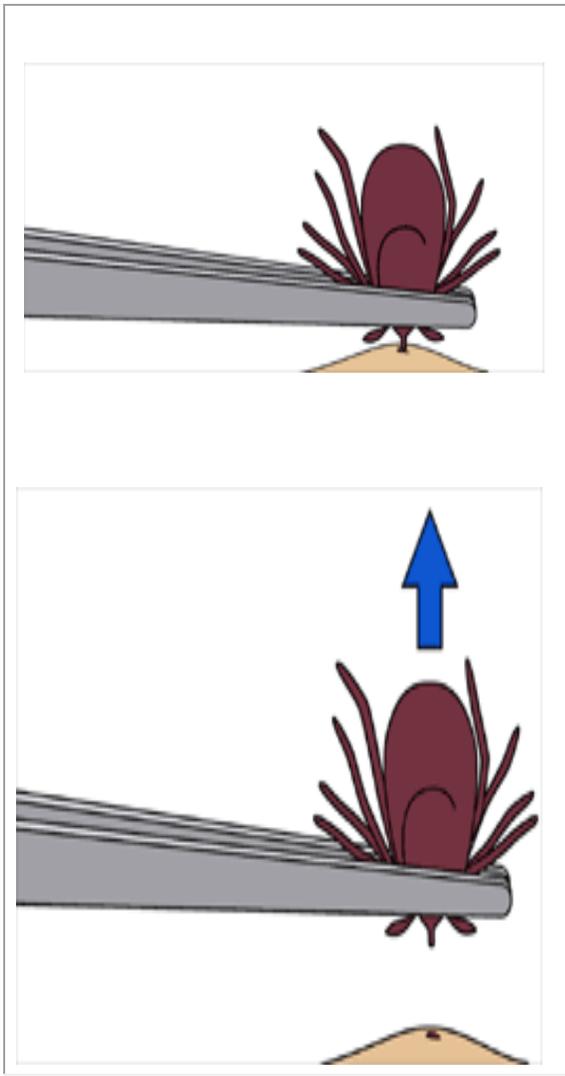


1 dot placed randomly within county of residence for each confirmed case

National Center for Emerging and Zoonotic Infectious Diseases
Division of Vector borne Diseases | Bacterial Diseases Branch



Tick Removal Procedure



Using a pair of pointed precision tweezers whose tips align tightly when pressed together, grasp the tick by the head or mouthparts right where they enter the skin. Do not grasp the tick by the body.

Without jerking, pull firmly and steadily outward. The barbed mouth parts may not let go easily, so be patient. It may take several minutes or more. Do not handle ticks with your bare hands.

Do not twist the tick out or apply petroleum jelly, a hot match, or any other irritant in an attempt to get it to back out. These methods can backfire and even increase the chances of the tick transmitting the disease.

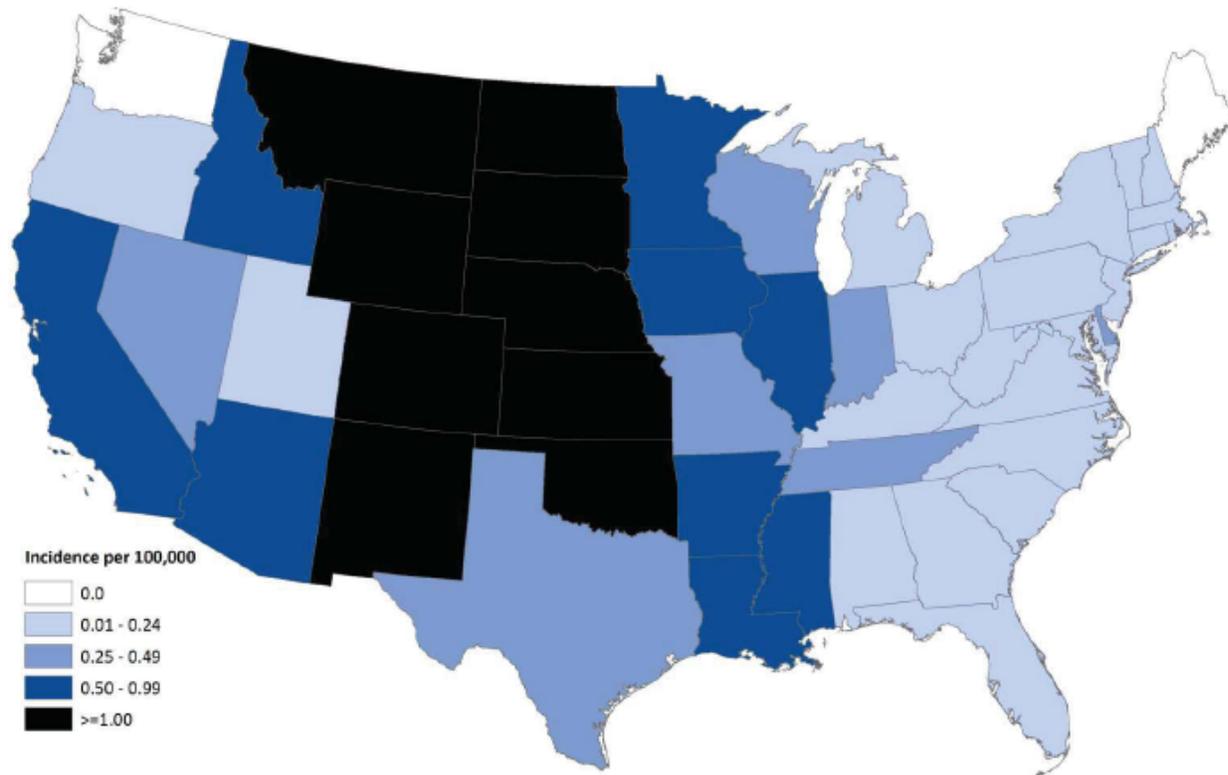
Place the tick in a vial or jar of alcohol to kill it. Never crush a tick with your fingers.

Clean the bite area and your hands with rubbing alcohol, an iodine scrub, or soap and water.

Monitor the site of the bite for the appearance of a rash beginning 3 to 30 days after the bite. Review the other early Lyme disease symptoms and watch to see if they appear in the same time frame. If these or any other unexplained symptoms develop, report it and see a physician immediately.



West Nile virus neuroinvasive disease incidence reported to ArboNET, by state, United States, 2013



Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention

West Nile virus neuroinvasive disease incidence maps present data reported by state and local health departments to CDC's ArboNET surveillance system. This map shows the incidence of human neuroinvasive disease (e.g., meningitis, encephalitis, or acute flaccid paralysis) by state for 2013 with shading ranging from 0.01-0.24, 0.25-0.49, 0.50-0.99, and greater than 1.00 per 100,000 population.

Neuroinvasive disease cases have been reported to ArboNET from the following states for 2013: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, West Virginia, Wisconsin and Wyoming.

Policy Number: 037**Authorized By:** Michael W. Bennett**Title:** Fleet Operations and Driver Safety**Effective Date:** 05/17/04Page 1 of 15

1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 To meet all federal and state DOT regulations and eliminate preventable accidents involving team members who drive vehicles utilized for company business.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Commercial Driver's License (CDL): A license issued by a State or other jurisdiction, in accordance with the standards contained in 49 CFR Part 383, to an individual which authorizes the individual to operate a class of a commercial motor vehicle.
- 4.2 CMV Commercial Motor Vehicle as defined in (§383.5 and §382.107):
A motor vehicle or combination of motor vehicles used in commerce to transport passengers or property if the vehicle:
- (1) Has a gross combination weight rating of 11,794 or more kilograms (26,001 or more pounds) inclusive of a towed unit with a gross vehicle weight rating of more than 4,536 kilograms (10,000 pounds); or
 - (2) Has a gross vehicle weight rating of 11,794 or more kilograms (26,001 or more pounds); or
 - (3) Is designed to transport 16 or more passengers, including the driver; or
 - (4) Is of any size and is used in the transportation of materials found to be hazardous for the purposes of the Hazardous Materials Transportation Act (49 U.S.C. 5103(b)) and which require the motor vehicle to be placarded under the Hazardous Materials Regulations (49 CFR part 172, subpart F).
- FMCSA regulates the driver hold a commercial driver's license (CDL) and be subject to alcohol and drug testing.
- 4.3 CMV Commercial Motor Vehicle as defined in (§390.5): If a vehicle travels interstate and falls within any one of the four categories listed below, it must have the US DOT number and legal company name displayed on the vehicle as required by the FMCSA marking requirements in 49 CFR 390.21.
- (1) Has a gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR), or gross vehicle weight or gross combination weight of 10,001 pounds or more, whichever is greater;
 - (2) Is designed to transport more than 8 passengers (including the driver) for compensation;
 - (3) Is designed to transport 16 or more people including the driver, and is not used to transport passengers for compensation; or
 - (4) Is transporting hazardous materials in quantities requiring the vehicle to be placarded.
- 4.4 Conviction: An un-vacated adjudication of guilt, or a determination that a person has violated or failed to comply with the law in a court of original jurisdiction or by an authorized administrative tribunal, an un-vacated forfeiture of bail or collateral deposited to secure the person's appearance in court, a plea of guilty accepted by the court, the payment of a fine or court cost,

or violation of a condition of release without bail, regardless of whether or not the penalty is rebated, suspended, or probated.

- 4.5 FMCSA: Federal Motor Carrier Safety Administration (Federal DOT).
- 4.6 FMCSR: Federal Motor Carrier Safety Regulations.
- 4.7 FRC: Cianbro Fleet Review Committee.
- 4.8 Gross Combination Weight Rating (GCWR): The value specified by the manufacturer as the loaded weight of a combination (articulated) vehicle. In the absence of a value specified by the manufacturer, GCWR will be determined by adding the GVWR of the power unit and the total weight of the towed unit and any load thereon.
- 4.9 Gross Vehicle Weight Rating (GVWR): The value specified by the manufacturer as the loaded weight of a single vehicle.
- 4.10 MVR: Motor Vehicle Records (driving records).
- 4.11 Public Road & Highway: Any road, street, or way whether on public or private property open to public travel. "Open to public travel" means that the road section is available, except during scheduled periods, extreme weather or emergency conditions, passable by four-wheel standard passenger cars, and open to the general public for use without restrictive gates, prohibitive signs, or regulation other than restrictions based on size, weight, or class of registration. Toll plazas of public toll roads are not considered restrictive gates.
- 4.12 Statute Miles: Is the actual road miles versus air miles.

5 Policy

- 5.1 Cianbro managers and supervisors shall enforce the guidelines set forth under this Safety Policy and Procedure for vehicles owned, rented/leased or maintained by Cianbro.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.
- 6.3 It is the responsibility of Cianbro drivers to immediately notify their supervisor of any accident/incident involving a moving violation, or of suspension or revocation of their driver's license. This includes accidents/incidents involving moving violations that occur while the driver is using his/her personal vehicle.

7 Fleet Operations and Driver Safety Index

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7.1 General Safety Practices

The scope of the program includes the following activities: motor vehicle record checks, physical examination/certificate, drug testing, driver safety training, vehicle inspections, vehicle maintenance, accident/incident reporting, investigation and review. Information will be shared, tracked and corrective action taken to eliminate the likelihood of accident/incident reoccurrence.

7.1.1 Drivers are required to obey all traffic laws while operating any vehicle on company business.

7.1.2 Seat belt use is mandatory for drivers and occupants of vehicles.

7.1.3 Cell phone use by the driver (including e-mail and text messaging) is strictly prohibited unless in use with a hands-free device. If the hands-free device is not available, safely pull over to a designated parking area (safe location) and come to a complete stop before use.

- This policy applies if Cianbro provides the cell phone and it is used for company or personal business whether in a Cianbro vehicle or a personal vehicle
- This policy also applies to the use of non-Cianbro issued cell phones used while driving for company business in any vehicle.

Please see Cianbro's Distracted Driving Policy 062 for all other prohibited types of distracted driving.

7.1.4 Perimeter inspections should be performed around all vehicles prior to entry into the vehicle to reduce the potential of backing incidents.

7.1.5 Cianbro drivers are required to wear Type II and Type III high-visibility safety vests whenever a driver exits a truck in a highway construction zone or within the right-of-way of federal-aid highways to unload or load a truck.

7.1.6 The vehicle must be appropriate for its intended use including the driver being knowledgeable of the vehicles weight capacity and payload limits. The use of personal vehicles to tow equipment for business use shall be the last resort. Howard Lynds at Cianbro Equipment, LLC or designee is responsible for providing approval. The following requirements must be met prior to approval.

- Team member must be a certified Cianbro driver with appropriate level
- The tow vehicle must have the appropriate rating, registration, brakes and lights as required by DOT regulations

7.1.7 Parking brakes are to be used any time a truck:

- Has a manual transmission

- Is being loaded or unloaded
- Is being used as a barrier vehicle
- Is parked on a hill

Parking surface must be free of ice and snow.

7.1.8 Wheel chocks are to be used any time a truck:

- Is parked on a hill
- Is being loaded or unloaded
- Is left running without a driver in the vehicle
- Is being used as a barrier vehicle
- Is parked if placarded for HAZMAT

Wheel chocks shall be positioned under the curbside wheels.

7.1.9 Dispatch and Trip Reports

Cianbro is required by the International Fuel Tax Agreement (IFTA) and Maine Fuel License to file quarterly fuel and mileage reports on all of our equipment in the 03, 04, 05, 06, 32, and 33 series. This information comes from a Dispatch & Trip Report that the driver of the vehicle is required to fill out weekly showing states traveled in, the routes used, toll roads used, mileages traveled in each state, on toll roads/non-toll roads and the quantity of fuel used. If the fuel is taken out of a bulk storage tank, that also needs to be documented on AD174 Gasoline and Diesel Fuel Report as well as the one on and off road mileages. If the fuel is purchased at the pump, a receipt must be attached to the trip report. All dispatch & trip reports should be submitted weekly to the equipment administration.

7.1.10 Other General Practices

The transportation or storage of illegal drugs, firearms or alcohol is strictly prohibited in vehicles owned or leased by Cianbro, or in personal vehicles being used for company purposes.

7.2 Commercial Learners Permit (CLP)

Cianbro drivers will have a current and valid motor vehicle license and receive the appropriate driver level training for the classification of the vehicle they are driving. A commercial learner's permit (CLP) is considered a valid commercial driver's license (CDL) for the purposes of behind-the-wheel training on public roads or highways and jobsites, if all of the following minimum conditions are met:

- The CLP holder is at all times accompanied by the holder of a valid CDL who has the proper CDL group and endorsement(s) necessary to operate the CMV. The CDL holder must at all times be physically present in the front seat of the vehicle next to the CLP holder (for passenger vehicles they can be in the first row behind the driver) and must have CLP holder under observation and direct supervision. The activities associated with training must be addressed in the daily activity plan.
- The CLP holder must have a valid driver's license issued by the same jurisdiction that issued the CLP.
- The CLP holder must have taken and passed a general knowledge/endorsement test that meets the Federal standards for the commercial motor vehicle that the CLP holder expects to operate.
- The CLP holder does not operate a CMV transporting hazardous materials

Note: For further clarification please reference part 383.25 of the Federal Motor Carrier Safety Regulations (FMCSR).

In an approved training program and designated area where there is no active work taking place, a CLP driver may operate without a CDL holder in the cab with them, for the purpose of training, as long as they have direct communication with an appropriate CDL holder (within sight and the use of a radio or CDL holder is acting as a spotter). Approval for this type of activity must come from the Cianbro Institute's Training Manager.

7.3 Classification and Certification of Qualified Drivers

The Project Superintendent has the responsibility to assure that drivers driving Cianbro vehicles meet the minimum requirements of this section IV as outlined in Table 1 of this document. This

includes verifying that the license is the appropriate class, that the team member has the appropriate endorsements for the Cianbro vehicle they will be operating and filling out the Driver Endorsement Application SD1067, available on Cianbro.net>Standard Operating procedures-SOP. Cianbro will not allow a team member to operate Cianbro vehicles at any time including just on site if he/she is not a qualified driver for the vehicle they will be operating.

- 7.3.1 Motor Vehicle Records (MVR) will be obtained on all Cianbro drivers quarterly or as needed. Drivers that are found with unsatisfactory driving records may be subject to corrective actions up to suspension or revocation of certification.
- 7.3.2 The operation of Cianbro vehicles is limited to team members (21 years of age or older) who are licensed, authorized, and qualified to operate a certain vehicle or class of vehicle. If a team member is under the age of 21, then:
 - They are not allowed to drive in District of Columbia. NO EXCEPTIONS.
 - All others will be determined on a case by case scenario by the Fleet Review Committee
- 7.3.3 Drivers are required to obtain endorsements for their commercial driver's license (CDL) to operate certain types of commercial motor vehicles. Endorsements are required to operate the following vehicles:
 - Double/triple trailers
 - Passenger vehicles
 - Tank vehicles
 - Vehicles required to be placarded for hazardous materials
- 7.3.4 Endorsements are indicated on the CDL as follows:
 - T for double/triple trailers
 - P for passenger
 - N for tank vehicle
 - H for hazardous materials
 - X for combination of tank vehicle and hazardous materials

At their discretion, individual States may have additional codes or additional groupings of endorsements. Additional state endorsements must be explained on the CDL.

- 7.3.5 A passenger endorsement is required when the vehicle is designed to transport more than 8 passengers (including the driver) for compensation; or it is designed to transport 16 or more people including the driver, and is not used to transport passengers for compensation.

Cianbro Certification Driver Level Grid

Driver Level	Level 1A	Level 1	Level 2	Level 3
Travel Radius	within a 100-mile radius from the base of operation within the state boundaries of Maine	within a 100-mile radius from the base of operations. May cross state lines	more than a 100-mile radius from the base of operations. Will need to complete HOS logbook	anywhere with appropriate endorsements (if required). Will need to complete HOS logbook
Gross Vehicle Weight (GVW) or Gross Vehicle Weight rating (GVWR)	of less than 26,000 lbs	of less than 26,000 lbs	of less than 26,000 lbs	of <i>greater than 26,000 lbs</i>
Cross State Lines?	No	Yes	Yes	Yes
License	Has to hold a State of Maine driver's license	A valid applicable class license with appropriate endorsements (if required)	A valid applicable class license with appropriate endorsements (if required)	A <i>valid CDL</i> license with appropriate endorsements (if required)
Training	Basic Driver Safety Training/with ride	Basic Driver Safety Training/with ride	Advanced Driver Safety Training/with ride	Advanced Driver Safety Training/with ride
Medical Card	Exempt	Yes	Yes	Yes
In the Random Pool?	Yes	Yes	Yes	Yes - as well as all DOT testing requirements.

Driver qualification file may be reviewed by the Fleet Review Committee (FRC) before the team member will be allowed to drive. Please allow up to 2 weeks for the final driver eligibility/ineligibility decision.

7.4 Fleet Review Committee (FRC)

7.4.1 Purpose

- Ensure fair and equitable treatment of team members.
- Review all accident/loss reports involving personal injuries and/or significant property/vehicle damage losses.
- Review/recommend initial and ongoing training.
- Foster driver participation in safety.
- Review records of high risk team members to determine driver eligibility and those specifically requested by the safety director.

7.4.2 Committee Membership

Committee make up will consist of at least 2 supervisory members. The assigned chairperson will select members to serve on the FRC. The committee will meet quarterly and as needed. The Driver Administrator will review accident/loss reports and

motor vehicle reports to determine driver records to be reviewed and present additional topics to be discussed at the meeting. Cianbro's established driver standards will be used by the committee in determining a driver's eligibility to operate vehicles owned/maintained by Cianbro. The committee reserves the right to review eligibility of drivers on a case-by-case basis.

7.5 Driver Standards/Guidelines

- 7.5.1 All of the requirements that drivers have to meet are listed in Table 1 below. The table is used for Cianbro drivers and for hiring purposes.
- 7.5.2 Cianbro managers and supervisors shall not allow drivers who are ineligible under this safety policy and procedure to drive vehicles owned/maintained by Cianbro. Team members who do not abide by this policy and procedure will be subject to the progressive discipline policy.
- 7.5.3 Driver suspensions will be communicated to project management, HR staff, and safety specialist as well as to the individual team members. The suspension of driving privileges will be documented in team member's electronic file. Driver suspensions will be effective from the date of notification and drivers will be asked to remove their driving level hard hat decal. When the term of suspension is complete, the suspension will be removed, team members will be notified and new hard hat decal will be issued.
- 7.5.4 Driving under the influence of drugs and/or alcohol is forbidden in vehicles owned or leased by Cianbro, or in personal vehicles being used for company purposes. Drivers must be aware of the side effects of over-the-counter and prescription medications they are taking and avoid operating Cianbro vehicles for company business if it could impair their driving skills.
- 7.5.5 Driver eligibility/ineligibility decisions may be referred to the Fleet Review Committee for review. Any individual who feels they have not been treated fairly shall be given the opportunity to discuss their situation with the VP HR, Safety & Health, VP of operations or other senior managers.
- 7.5.6 Table 1 Cianbro Driver Guidelines

<p>A driver may not operate a registered vehicle or equipment if:</p> <ul style="list-style-type: none"> • Team member does not have a valid driver's license • Is not at least 21 years of age (unless approved by the Fleet Review Committee) • Is not approved by the Fleet Review Committee (Section 7.1- General Safety Practices) • Does not have the proper endorsements • Does not return required documents to Driver Administrator, as required by law
<p>Per Cianbro's Drug and Alcohol policy:</p> <ul style="list-style-type: none"> • Any driver testing positive on any type of drug or alcohol screen will have driving privileges suspended for a minimum of 30 days and may extend longer if EAP requirements have not been completed • Any driver testing positive on any type of drug or alcohol screen for a second offense will be terminated
<p>The FRC will decide if driving privileges should be suspended for the following:</p> <ul style="list-style-type: none"> • Any driver with more than 2 accidents in the last 3 years or more than 1 accident in the last year • Any driver with more than 5 moving and /or non-moving violations in the last 3 years or with more than 2 moving violations in the last year
<p>Motor Vehicle Violations: Serious Offenses while driving a CMV or non-CMV</p> <p>Drivers with 2 convictions for any of the following serious moving violations in separate incidents within the last 3 years will result in driving privileges being suspended for 60 days. With 3 convictions in separate incidents within the last 3 years, privileges will be suspended for 120 days.</p> <ul style="list-style-type: none"> • Excessive speed – more than 15 MPH over the posted speed limit • Improper or erratic lane changes in any motor vehicle • Following too close in any motor vehicle • Disqualification for railroad-highway grade crossing offenses (3rd offense results in loss of CDL for 1 year) • Reckless driving in any motor vehicle • A traffic violation arising in connection with a fatal traffic accident in any motor vehicle • Driving a CMV (§383.5 and §382.107) without obtaining a CDL or without proper class of CDL or endorsement

- A CDL Driver driving without a CDL in their possession
- Violation of a State or local law or ordinance on motor vehicle traffic control prohibiting texting while driving a CMV including while temporarily stationary because of traffic, a traffic control device, or other momentary delays
- Violation of a State or local law or ordinance on motor vehicle traffic control restricting or prohibiting the use of a hand-held mobile telephone while driving a CMV including while temporarily stationary because of traffic, a traffic control device, or other momentary delays
(Please see Cianbro's Distracted Driving Policy 062 for all other prohibited types of distracted driving.)
- Any other reason deemed necessary by FRC

The following FMCSA suspensions apply to convictions a team member receives in their personal vehicle and/or company vehicle (CMV).

Driving privileges will be suspended for 1 year after a first offense. After a second offense you will be disqualified from driving a CMV for life (10 years) regardless of the time period between offenses.

Major Offenses:

- Leaving the scene of an accident
- Refusal to take an alcohol test as required by a state or its jurisdiction (team members who refuse to submit to a substance abuse test required in accordance with Cianbro's Substance Abuse Program will be terminated immediately)
- A driver convicted of being under the influence of alcohol (OUI) as prescribed by state law.
- Convicted of being under the influence of a controlled substance
- Using a vehicle to commit a felony (unless it involves a controlled substance, see below.)

The following FMCSA suspensions apply to convictions a team member receives in a company vehicle (CMV). Driving privileges will be suspended for 1 year after a first offense and you will be disqualified from driving a CMV (26,001 lbs) for life (10 years) upon second offense based on the conviction of the following violations while operating a CMV (26,001 lbs), regardless of the time period:

- Having an alcohol concentration of 0.04 or greater
- Driving a CMV (§383.5 and §382.107) after privilege has been suspended, revoked or otherwise disqualified
- Causing a fatality through the negligent operation of a CMV (§383.5 and §382.107)

Driving privileges will be suspended for life and are not eligible for reinstatement if:

- You are convicted of using any vehicle in the commission of a felony involving the manufacturing, distributing, or dispensing of a controlled substance.

Violation of Out of Service order:

If the driver is convicted of violating an out-of-service order they are subject to a disqualification period as determined by the FMCSA.

- First conviction – disqualification for 6 months to 1 year
- Second conviction in a separate incident during 10 year period – disqualification for 2 to 5 years
- Third or subsequent conviction in a separate incident during a 10 year period – disqualification for 3 to 5 years

7.6 Motor Vehicle Record (MVR)

7.6.1 Applicants for driver classification are notified in writing that their MVR's will be obtained as part of the qualification process to drive for Cianbro.

7.6.2 Motor Vehicle Records will be obtained for the following team members:

- All team members (including newly hired) who are classified as drivers.
- At a minimum MVR reports will be obtained for all level drivers yearly.
- MVR reports obtained for any Cianbro driver as requested by the Fleet Review Committee.

7.6.3 Review for OUI/DWI status. If applicant is found with an OUI/DWI conviction within the previous year of applying, the applicant will be placed on suspension for one year upon hire.

7.7 Physical Examination and Certificate

- 7.7.1 Cianbro requires applicants by FMCSA guidelines to be fully qualified physically to perform all duties and functions of driving and safely operating a commercial motor vehicle.
- Pre-employment Department of Transportation (DOT) physical examinations will be performed through Cianbro approved clinics on all driver applicants, except those applying for Level 1A or that provide a current DOT medical card.
 - Driver applicants who successfully pass the physical examination will be issued a medical examiner's certification card. A copy of the medical examiner's certification card will be placed in the driver's qualification file, and the original will remain in the possession of the driver at all times while on duty or operating a company vehicle.
 - Cianbro level 3 driver applicants must also pass a DOT drug screen.
- 7.7.2 Drivers who fail to successfully pass their DOT physical and do not complete the necessary medical follow-ups required for the DOT card within a 30-day period will have their driving privileges suspended indefinitely. Additional medical information may be needed in order to determine if you are capable of safely and effectively performing your job. Any costs incurred acquiring this additional information is at your expense. Any driver who fails their required DOT physical due to medical reasons may request to be removed from the driver program. A driver that currently holds a Level 1, 2 or 3 and fails the required DOT physical cannot be moved to a Level 1A; however, a team member may petition the FRC on a case by case basis.
- 7.7.3 All drivers, prior to pre-employment or post employment, must also pass a reference check that includes a check of any prior drug testing. The form PD 602D should document this reference check.

7.8 Drug Testing

All team members in driving positions will be subject to drug testing under probable cause, post accident, and random testing. Cianbro's Substance Abuse Program and Department of Transportation (DOT) regulations govern the substance abuse and alcohol testing of Cianbro truck drivers with a commercial drivers license in accordance with 49 CFR Part 382 - Controlled-Substances and Alcohol Use and Testing. For more information, contact corporate human resources, or refer to the Cianbro Substance Abuse Program Manual or the Federal Motor Carrier Safety Regulations Handbook.

Drivers who test positive for substances of abuse will have their driving privileges suspended and will be referred to the team member Assistance Program as a condition of continued employment. Failure to complete the recommendations of the team member Assistance Program will result in termination.

7.8.1 Probable Cause

Cianbro will require all classes of drivers to submit to an alcohol and/or controlled substances test when we have probable cause to believe that the driver has violated Cianbro's policy concerning alcohol and/or controlled substances. A supervisor who has successfully been trained in recognizing the signs of substance abuse must witness behavior that indicates the use of drugs or alcohol before a test may be performed. Probable cause requires the driver to undergo an alcohol and/or controlled substances test based on specific observations of the driver.

7.8.2 Post-Accident

There are three situations in which a CDL driver (Cianbro Level 3) must be DOT tested for drugs and alcohol following an accident:

- Any time the accident results in a fatality
- If the commercial driver (regardless of fault) receives a citation within 8 hours of the occurrence and someone in the accident is injured and receives immediate medical attention away from the scene
- If the commercial driver (regardless of fault) receives a citation within 8 hours of the occurrence and one or more vehicles incur disabling damage requiring the vehicle to be towed from the scene

Please see the table below for clarification on when to administer post-accident DOT testing:

Post-accident Test Criteria

Type of Accident Involved	Was a citation issued to the CMV Driver within 8 hours of the occurrence	Test Must be Performed by Employer
Human fatality	YES	YES
	NO	YES
Bodily injury with immediate medical treatment away from the scene	YES	YES
	NO	NO
Disabling damage to any motor vehicle requiring tow away	YES	YES
	NO	NO

Post-accident testing is time-sensitive.

An alcohol test must be administered within 2 hours; if not, the company has up to 8 hours to complete it. If it is not administered within 2 hours, Cianbro shall prepare and maintain on file a record stating the reasons the test was not promptly administered. If an alcohol test is not administered within 8 hours following the accident, Cianbro will stop all attempts to administer the alcohol test and document the reasons why the test was not performed.

Controlled-substance tests must be administered within 32 hours following an accident. If the controlled-substances test is not administered within 32 hours, Cianbro will stop all attempts to administer a controlled-substances test and prepare and maintain on file a record stating the reasons the test was not promptly administered.

7.8.3 Random Testing

Cianbro will conduct random controlled substances tests on all classes of drivers and random alcohol tests on CDL drivers. The Federal Motor Carrier Safety Regulations mandate that 50% of CDL (Level 3) drivers employed by Cianbro be tested annually for the use of controlled substances and that 10% of the CDL drivers employed by Cianbro is tested annually for the use of alcohol. Cianbro's substance abuse policy provides for random drug testing of non-CDL drivers (Level 2, Level 1 & 1A). Cianbro will notify drivers when they are chosen. Drivers must report immediately to the testing site upon notification of being selected.

7.8.4 Return to Duty and Follow-Up

Testing is required after rehabilitation for a driver that has tested positive for drugs or alcohol as required by DOT regulations for all CDL (Level 3) drivers. The substance abuse professional will determine return-to-duty and follow-up testing for non-CDL (Level 2, Level 1 and 1A) drivers.

7.9 Cianbro Drivers' Training Program

7.9.1 Cianbro will provide a basic level of driver safety training for applicable team members, including conducting a safety ride and documenting for skill levels. When applicable, specialized driver training may be required for different driving levels and driving applications. Driver knowledge of Federal Motor Carrier Safety Regulations (FMCSR) is required by law. It is not the intent of this program to train drivers at the basic operations level, but to raise the levels of safety, skill and professionalism of Cianbro drivers. Team members who are supervisors of drivers are required by law to attend a one-time two-hour drug and alcohol training.

7.10 Driver Qualification File Contents

7.10.1 Cianbro will maintain a driver's qualification (DQ) file for all drivers that will contain the following:

- Annual motor vehicle record from appropriate state(s)
- Driver's License or certificate accepted in lieu of a road test
- Medical exam certificate, original or a copy (if applicable)
- Any letter granting a waiver of a physical disqualification
- Annual review of driving record
- Annual list of violations
- Application for employment
- Receipt of substance abuse & alcohol background information for CDL drivers
- Any other matter relating to a driver's qualifications or ability to drive a motor vehicle safely

7.10.2 Driver qualification files will be maintained at the Corporate HR office for the duration of the driver's employment and three years thereafter.

7.10.3 All Cianbro drivers are required to supply the necessary information to keep Driver's Qualification files current and accurate. Notification will be mailed to the drivers' home of documents that are required each year. Drivers are responsible to return the document(s) requested in a timely manner. Non-compliance with this request may lead to suspension of certification.

7.11 Roadside Inspections

7.11.1 Any vehicle with a U.S DOT decal and U.S. DOT number must stop for all roadside inspections. When a driver is approached to undergo a roadside inspection, he/she must pull off immediately to the area designated by the inspection officer. If you are chosen for an inspection:

- Be sure the inspector provides you with a written report. The Pittsfield driver administrator needs to be aware of all roadside inspections and citations (positive or negative).
- If a camera is available, take a photo of any violation that is indicated while the inspector is there.

The resulting inspection report must be given as soon as possible to the driver's supervisor, who is responsible to forward it to the Pittsfield Equipment Administration who will provide a copy to the Pittsfield driver administrator.

One of the main focus areas the FMCSA monitors during roadside inspections is cargo securement. This area has the highest severity weight ratings for carriers, which can potentially lead to audits and complete Out of Service status for the entire company.

A vehicle placed out-of-service cannot be operated until all repairs required by the out-of-service notice have been completed. A driver may be placed out-of-service if the driver does not meet qualification requirements or has violated the hours of service rules. A driver placed out-of-service must not resume driving until the out-of-service condition is rectified.

7.11.2 Roadside Inspection Violations

A Lesson Learned will be completed on all roadside inspection violations issued by a law enforcement entity. A Lesson Learned is a great tool for sharing information about overcoming obstacles, addressing why the situation occurred and preventative measures for the future. A Lesson Learned is a positive experience, situation in which we learn a valuable lesson and share throughout the company. All incidents will be investigated to determine root causes and corrective actions.

7.12 Hours of Service and Driver Logs

The submission of accurate, true, neat and legible daily logs is an integral part of this commitment.

100 Air Mile Exemption: All Level 1 and 1A drivers traveling within a 100 air mile radius (115 statute miles) from the base of operation are exempt from the driver log requirement.

7.13 Vehicle Inspections

7.13.1 Pre-Trip Inspections

Vehicle inspections are to be performed by the operator at the beginning of each day or shift to ensure that the vehicle is fit for safe operation on Operator's Safety Inspection SH925. The driver will also review the last completed Operator Safety Inspection Report to verify that any needed repairs were made to the vehicle prior to them taking responsibility of the vehicle.

The driver must be satisfied that the vehicle is in proper working condition prior to operating. This includes the following:

- Service brakes, including trailer brake connections
- Parking (hand) brake
- Steering mechanism
- Lighting devices and reflectors
- Tires
- Horn
- Windshield wipers
- Rear vision mirrors
- Wheels and rims
- Coupling devices
- Emergency equipment

The driver of the vehicle is ultimately the responsible party for the cargo once it leaves the yard/jobsite where the cargo was loaded. The driver will be the person to receive the roadside inspection violation.

- The driver must be satisfied that cargo is properly distributed and secured. The vehicle's cargo or other objects must not obscure the driver's view or interfere with the driver's movement.
- All cargo must be secured and within the manufacturer's legal limits to the truck in a manner so as not to move. It takes time, effort and good planning to ensure safe cargo securement. Improper securement could be a danger to others and yourself.
- The combined strength of all tie-downs must be rated strong enough to lift ½ times the weight of the item tied down. Use at least 1 tie-down for every 10' of cargo. Usually a 10' item will require 2 tie-downs.
- Keep all chains, binders, ratchet straps, roll ups in useable condition by checking items over each time they are used. Check chain for bent or stretched links, worn pins, missing cotter pins. Keep binders oiled where they swivel, ratchet binders are to be kept so the threads are clean. Roll-ups need to be inspected for tears or chafing, keep ratchet straps in the same condition and oil the clicker often. Only use approved bars to tighten chain and straps.
- For more information on cargo securement refer to the Cargo Securement Handbook for Drivers

The driver is required to make sure that the appropriate Hazmat Bill of Lading is within reach of the driver while buckled in and on the driver seat when the driver is not in the vehicle. MSDS/SDS sheet for the chemical being transported must also be in the vehicle.

In all vehicles the following information/materials are required.

Glove Box - In the Blue Pouch:

- Registration- must be current
- Insurance card- must be current also
- Copy of commercial motor vehicle inspection report, if required
- Cianbro Loss Report (accident form), with guidelines
- Laminated Hazardous Material manifest sheet with erasable marker
- Hazardous Materials Registration Certificate, if bulk amount of hazardous materials will be transported
- Equipment data card
- Equipment service record card
- Cargo Securement Handbook for Drivers

In Cab of Truck:

- Emergency Response Guidebook
- ABC rated fire extinguisher, with current inspection tag.
- First Aid kit, to include eyewash solution w/ non- expired date.
- Valid inspection sticker, if required.

On / In Vehicle:

- Spare Tire
- Vehicle jack, handle, and lug wrench
- Wheel chocks
- Reflective emergency warning triangles (3)

7.13.2 On-the-Road Inspections

- A. On the road, the driver must re-examine his/her vehicle and cargo and the devices used to secure the cargo within the first 50 miles of a trip and make any adjustments to the cargo or load securement devices as necessary. Driver should add more securement devices to ensure that cargo cannot shift on or within, or fall from the commercial motor vehicle.
- B. Reexamination and make any necessary adjustments whenever:
- The driver makes a change of his/her duty status; or
 - The commercial motor vehicle has been driven for 3 hours; or
 - The commercial motor vehicle has been driven for 150 miles, whichever occurs first.

If a problem is found, the driver will either have the necessary repairs or adjustments made prior to operating the vehicle, or safely travel to the nearest repair facility.

7.13.3 Post-Trip Inspection

- A. Each driver is required to complete a written vehicle safety inspection (SH 925) at the end of the day, or when he/she finishes driving the vehicle for that day. The vehicle must be identified on the report. The regulations require that any defects in the following equipment items be noted:
- Service brakes including trailer brake connections
 - Parking (hand) brake
 - Steering mechanism
 - Lighting devices and reflectors
 - Tires
 - Horn
 - Windshield wipers
 - Rear vision mirrors
 - Coupling devices
 - Wheels and rims
 - Emergency equipment

The driver must also note any other defects that would affect the safe operation of the vehicle or result in its mechanical breakdown. The report must also indicate if no defects are found. The driver must sign the report.

- B. Defects: When a driver reports safety related problems, he/she submits the SH 925 inspection report to their immediate supervisor. The job site supervisor must verify the defects, correct them, and forward the SH 925 report to Pittsfield Equipment Administration.

7.14 Vehicle Maintenance

- 7.14.1 Regular maintenance of equipment is an essential element of Cianbro's operation. Part 396 of the Federal Motor Carrier Safety Regulations (FMCSR) requires motor carriers to inspect, repair and maintain all motor vehicles under their control. At Cianbro, it is our policy to keep all company transportation equipment well maintained and in safe

and efficient operating condition at all times. At Cianbro we use a 'preventive maintenance' approach with our transport equipment.

7.15 Accident Guidelines

7.15.1 Deal with Immediate Problems

- Stop immediately, stay calm, turn on your four-way flashers, and pull your vehicle as far off the roadway as safely possible to prevent another accident.
- Do a quick evaluation of the accident. Watch for fire, spilled materials, traffic, etc. Take all precautions to prevent further accidents.
- Provide assistance to any injured party and call or arrange for someone to call for emergency medical assistance.
- Report any accidents to the local police. Be courteous and cooperative when providing information to these authorities. Never admit guilt or liability at the scene of an accident.
- If the accident involves an unoccupied vehicle, try to find the owner. If you cannot find the owner, leave your name, address and phone number, along with the company's name and phone number. Put the information in a visible location, such as under the windshield wiper blade. You should also make note of the make, model, year, license number and description of the other vehicle to provide to Cianbro.

7.15.2 Gather and Report Accident Information

- A. Document the incident and immediately report the accident to your supervisor and/or safety specialist. Provide your Cianbro contact with a location and/or phone number where you can be reached for further information and instructions. If you are unable to reach your supervisor or safety specialist, contact your Regional Office or the Corporate Office and speak with a Human Resource Representative.

Northern New England	800-315-2211
Southern New England	860-286-3000
Mid-Atlantic	410-636-3000
Ricker's Wharf	207-773-5852
Corporate	800-315-2211

- B. A Loss Report must be filled out whenever a Cianbro vehicle is involved in an accident. This form is available on Cianbro.net>Standard Operating Procedures-SOP. When completing a Cianbro Loss Report be sure to get all names, addresses, license numbers, insurance companies involved and other information regarding the accident. The supervisor of the team member involved in the accident is responsible for investigating the accident making sure the Loss Report is completely filled out and that the signed original form is forwarded to Cianbro Equipment, LLC.
- C. A fleet accident register must be maintained showing all fleet accidents and DOT recordable accidents. The Equipment Administration department maintains the fleet accident register. This register must be kept for three years after the date of each accident. For required information that must be maintained on this register refer to 390.15 of the FMCSR.
- D. An accident is DOT recordable, and records must be kept if one or more of the following results from the accident:
- Any time the accident results in a fatality
 - If the commercial driver (regardless of fault) receives a citation within 8 hours of the occurrence and someone in the accident is injured and receives immediate medical attention away from the scene
 - If the commercial driver (regardless of fault) receives a citation within 8 hours of the occurrence and one or more vehicles incur disabling damage requiring the vehicle to be towed from the scene

7.16 Ergonomic Risk Factors

7.16.1 Truck drivers have an increased exposure to three specific risk factors:

- While sitting your pelvis rolls backward and the small of your back flattens out increasing the pressure in the discs of your spine. In this position, the discs are less prepared to handle the vibrations from the vehicle. While driving, ligaments stretch and slacken. Even after standing up ligaments remain slack for a while and cannot support the spine as they would.
- Constantly having to hold the foot pedal down over a long period of time even has its hazard as it may cause stiffness and spasm in the legs and low back.
- Whole Body Vibration exposure comes from the bumps in the road as they cause up and down vibrations. These vibrations generally come up through the feet/buttocks when driving in a vehicle. WBV stimulates bursts of back muscle activity. This causes the neck and back muscles to tire more quickly, and decreases the support these muscles can give to your spine.

7.16.2 How can we avoid these hazards?

- Adjust your seat and steering wheel making sure you have neutral body posture.
- Make sure that your lower back is being supported and you can press the pedals without moving your lower back forward off the back of the seat. Avoid slouching and use a lumbar support. It can be as simple as placing a rolled up towel in the natural curve of your spine.
- Keep suspension system in top working order. Shocks absorb some vibration exposure.
- If possible tilt your seat a notch or two back and forth every 20-30 minutes.
- When possible, take a rest break (5 minutes per hour of driving) and stretch but not force.
- Within reasonable limits, shift positions regularly while driving.
- Don't jump down from the truck. This is a huge stress on your spine.
- Avoid lifting immediately after driving for long periods as our muscles are tired, ligaments are stretched and the discs in your spine are at a greater risk for injury. Give yourself 1 or 2 minutes before trying to lift anything.

7.17 Safety At Home

Cianbro is concerned with every team members' safety whether at work or at home. Remember that being a driver gives you an enormous amount of responsibility while in your personal life as well as work life. Cianbro asks that you take the same precautions in your personal driving as we ask of you when driving for the company.

- Wear your safety belts
- Drive sober
- Focus on the road
- Drive defensively
- Never talk or text on a cell phone while driving
- Follow posted speed limits

8 Budget / Approval Process

- 8.1 The Fleet Review Committee and Corporate Human Resources will make changes to this policy and procedure as deemed necessary or as the FMCSR's change.

9 Related Documents

- 9.1 Documents available on Cianbro.net>Standard Operating Procedures - SOP or through the Equipment Shop

Driver Endorsement Application	SD1067	SOP
Operator's Safety Inspection	SH925	Equipment Shop
Gasoline and Diesel Fuel Report	AD174	Equipment Shop
Loss Report		SOP
Hazardous Materials Driver Safety Guidelines Card	SD885	SOP

Policy Number: 038**Authorized By:** Michael W. Bennett**Title:** Injury Management**Effective Date:** 02/01/93Page 1 of 11

1 Status

1.1 Update of existing policy, effective 12/04/14.

2 Purpose

2.1 To allow injured team members to recover in the workplace.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 None.

5 Policy

5.1 To provide modified work opportunities to all team members for work related and non-work related injuries or illnesses.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Injury Prevention

- 7.1.1 First and foremost our primary focus must always be on injury prevention. We need to take a proactive approach to eliminate hazards and thus injuries.

7.2 Injury Management

- 7.2.1 All applicants offered employment will complete a pre-placement medical questionnaire before they start work. Our medical director will designate appropriate work modifications based on the medical questionnaire. The team member will receive written notification of the results of this process from Occupational Medical Consulting. When s/he arrives at the job site s/he will be asked to review work modifications and sign an agreement not to exceed those guidelines. It is the joint responsibility of the team member and project supervision to be sure these guidelines are followed.
- 7.2.2 When a work related or non-work related injury or illness occurs the team member will report the incident **as soon as it happens** to their supervisor or safety specialist. By reporting an injury immediately, we can minimize its impact on the team member and on the job site.
- 7.2.3 A First Report of Incident will be completed and the team member may be taken to an established medical treatment facility to have the injury/illness checked after first aid protocols have been ruled out. The decision about work modifications will be left up to the medical practitioners.
- 7.2.4 Identified work modifications should be written on the Cianbro Work Modifications form, M-1, or other state specific medical form by the attending medical practitioner. The team member will agree to work within those guidelines by signing the Modified Work Agreement. This sequence of events prepares us for the most successful outcome of an injury/illness.
- 7.2.5 Work related injuries will be covered by workers' compensation insurance. Non-work related injuries will be paid for by the team member's health insurance, if eligible at the time of the incident. If the team member does not have health insurance and has a non-work related injury, the injury/illness **MUST** be reported just the same, so that medical attention can be sought and work modifications established to gain successful outcome. Therefore, the job will cover costs for the first visit to the medical provider, for the purpose of establishing the work modifications. **Follow-up visits to reduce or remove work modifications will be the responsibility of the team member.**
- 7.2.6 An injury management training PowerPoint presentation is available for safety specialists, alternate safety specialists or managers looking for additional guidance. The presentation can be used as training for new safety specialists, a refresher course for current safety specialists, or for supervisors and managers to better understand the injury management processes and reasons behind these processes. Please contact the Disability Management Department for a copy of this presentation.

7.3 Medical Surveillance

7.3.1 In accordance with OSHA and other federal requirements, Cianbro will perform periodic physical exams and medical surveillance monitoring. (DOT physical exams, DOT random drug testing, annual hearing testing, pulmonary function tests and testing blood lead levels, etc.) Results of these medical surveillance tests are kept at Occupational Medical Consulting by our medical director.

7.4 Medical Disability-Non-Work Related Injury/Illness

7.4.1 If a non-work related injury or illness causes a team member to become unable to work for a period of time, the team member needs to contact the jobsite so that a first report of incident can be completed. This will ensure that the job will have what they need to do a medical leave separation. The first report of incident should be e-mailed to the Disability Management Group at cianbrodm@cianbro.com. Complete the medical separation form and submit using the instructions provided on the form. Our Team Member Handbook gives more information about the medical leave policy and disability benefits.

7.5 Return-To-Work from Work Related or Non-Work Related Disability

7.5.1 Before Cianbro will provide modified work, we need to secure the appropriate documentation from the medical provider. This includes a release to work, and a listing of any restrictions or modifications.

7.5.2 Our commitment is to provide a safe return to work as soon as possible for that team member. Our Modified Work program, and the tools such as the Work Modifications form, allows us to work together for a timely and safe return to work.

7.6 Grab N Go

7.6.1 All jobs must have a Grab N Go Folder. In the event of an injury or illness reported on the jobsite, the safety specialist or other accompanying manager will grab the folder to bring to the medical facility. The documents to be included are found on the SOP and should be printed out and kept in a folder that is posted in a highly visible, easily accessible location. This folder provides all the forms and information needed for injury management and includes:

- Disability Management Group Contact Chart
- Pertinent Phone Numbers and Instructions for clinics and Cianbro jobsite contact
- Travelers Adjuster list and mailing addresses for billing by state
- Employer's First Report of Incident (Blank Form DM001)
- Work Modification Form (Blank Form DM002)
- How to batch work mod agreements, look up first reports and work mods in CMIC
- Phases for Modified Duty Costs
- Explanation of OSHA restricted work day cases
- Modified Work Agreement (Blank Form DM003)
- Informational Handouts on Worker's Compensation RX programs (First Script for Disability Management job sites, Healthsystems for Travelers covered job sites).
- Mileage Record Sheets (for use of reimbursable mileage of work related injured team members)
- OSHA 300 Acceptable non-recordable first aid list
- Admissible non-recordable dosages of non Rx medications
- Clinic protocol for Bloodborne Pathogen exposure should be housed in the Grab N Go folder but still will need to be provided by the jobsite safety personnel.
- Injury Management Best Practices (Clinic Visit Guidelines)

7.7 Injury Management Clinics

7.7.1 For all new clinics/providers a meeting should take place between our safety personnel and the clinic's medical director and business manager. This is to establish a relationship with the provider and to introduce Cianbro's Injury Management Process. Upon request someone from the Corporate Disability Management group will attend. Projects are encouraged to contact the Corporate Disability Management group before scheduling this meeting, so that a member of this group can attend the meeting and provide additional information and support.

7.7.2 If there are concerns or problems at existing clinics, contact the Disability Management group to assist in resolving any issues.

7.8 Recordkeeping Requirements

- Cianbro must keep records of all work related fatalities, injuries, and illnesses.
- Each recordable injury or illness must be entered on the OSHA 300 log within 7 calendar days of receiving information that it is recordable.
- Each jobsite is responsible to post their respective OSHA 300 log summary for the previous year from February 1st through April 30th annually. The log summary must be signed by a company official and posted in a place visible to team members.
- All recordkeeping forms must be retained for five years following the end of the calendar year that these records cover.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 See attachments.

Injury Management Best practices

The following is an overview of injury management best practices to be used by safety, supervisors and managers to both be prepared ahead of time to handle a workplace injury and how to manage the injury to get the best possible outcome.

The first priority is always to avoid any work-related illnesses or injuries. We strive to send our team members home in the same or better condition than they arrived in every day. In the event that an injury does occur, our main goal is always to ensure that our team members get the best possible care. As long as that goal is satisfied, our next priority is to prevent a recordable or lost time incident.

Before work begins:

- Create a written plan at the PMP for injury management
 - Identify meaningful light duty work alternatives
 - Identify and communicate the names of injury management individuals on all shifts.
 - Ensure proper training is given to front line supervisors, alternate safety specialists and managers on how to manage injuries.
 - Practice and role play injury management scenarios, discuss and identify what to do in certain cases – bee stings, sore knee, etc. How to walk the fine line between asking for alternatives to recordable options and directing care
 - Shift mindset from reactive to proactive
 - Emphasize “no blame”. It is not a punishment to go to a clinic. Explain how prompt treatment often saves a recordable
 - Identify a regional safety contact as a resource, first point of contact after stabilizing the injured TM
 - Consider onsite medical – nurse/EMT/visiting physician to provide care for minor incidents and/or establish restrictions.

- Always identify the best medical facility in the area to take an injured team member prior to starting the job. Remember, best is not always the closest.
 - Try to avoid emergency rooms whenever possible. ERs are set up to give one time care and are typically not receptive to our injury management process. Also, follow up with the same provider is almost never possible.
 - Upon identifying a facility, site safety must visit the facility and explain our injury management program. Include some combination of site management, corporate DM representative, or nurse case manager in the visit when possible. Developing this relationship prior to an incident will make a huge difference when trying to manage an injury. Our efforts to work with the provider to avoid recordable injuries will be much less successful if we have not taken the time to develop this relationship first.
 - Identify backup clinics and take the time to visit those clinics as well
 - Contact Disability Management if you need help locating a clinic
 - Invite the provider to tour your site! They will become more familiar with the setting and be better prepared to understand and accept our modified duty program once seeing how it can be put into practice.

- Grab and Go – review, print, scan to your phone so you have access to it when needed. This contains documents and information needed to help you effectively manage the injury. Ensure it's posted at your jobsite as well.
- Keep a list of pertinent contacts/phone numbers for assistance.

When an injury occurs:

- First stabilize the TM and provide any onsite first aid that may be needed. Determine immediately if it is an emergency situation where 911 should be called or the TM should be taken to an ER.
- When in doubt as to whether medical attention is needed, always err on the side of caution. Once an injury is reported, it is better to take the team member right away to a clinic for evaluation and possible treatment. If medical attention is delayed, we risk that the injury becomes more significant due to lack of treatment or work modifications.
- Call your regional safety contact or the corporate Disability Management Department on your way to the medical facility. They can coach you based on the nature of the injury and answer any questions you or the TM may have.
- The primary reason for accompanying a team member to the clinic/medical facility is to ensure that they receive the care that they need and that we understand all work modifications.
- At the clinic, always ask the team member if it's okay to accompany them in to see the physician. Having the opportunity to discuss treatment options and explain our return to work policy with the physician is essential. Always go in with the team member unless;
 - The facility has a policy prohibiting it
 - The physician has a policy prohibiting it
 - The team member requests that you don't
- In cases where you can't go in, always request to have an opportunity to talk with the physician after the exam. Prior to leaving the facility, you need to verify with the physician whether the team member can return to work for their next shift, whether they have significant work modifications, whether they were prescribed medication or physical therapy, or anything else that may have made it recordable. Also look at the M-1 (worker's comp paperwork) that the doctor fills out as soon as it's available. Make sure you can read it, and ask for clarification if you can't. If you did not go in to the visit, ask the TM if the form reflects what they discussed. **The most effective time to discuss these issues and try to make positive change is before you leave the facility.**
- Always assure the physician that our main goal is the best care for our team member. If in keeping with that goal, an appropriate non-recordable treatment exists, that is our preference. Do not challenge the physician's judgment. Simply ask if there is a non-recordable option.
- Let the physician do their thing during the exam. We do not want to come across like we are telling them how to do their job. Familiarize yourself with the non-recordable treatment alternatives as outlined in the Grab and Go. If the physician suggests a form of treatment that would make it recordable, ask about a non-recordable alternative.
- If the physician is considering treatment as a measure of precaution only (ex., preventative antibiotics), remember that we can always offer to take the TM back the very next day to be reassessed. Follow up visits do not have to be pre-authorized, so adding another visit just to ensure that the TM is doing okay without the medication may be preferable to both the clinic and the TM.
- There will be some injuries that we know are recordable before we even get to the medical facility (stitches, broken bones, etc.). In these cases, we need not try to avoid prescription medication or other things that would make it recordable. Our focus at that point is to avoid a lost-time incident.
- If the physician mentions taking the team member out of work, explain that we have a very accommodating and proven return-to-work and modified duty program. We are able to allow the team member to remain at work and find them something constructive to do under the most stringent restrictions. We will provide transportation if the team member cannot drive. The team member needs to be released to go back to work **the following day** regardless of whether they are scheduled to work or not or it is an OSHA lost time incident. Review paperwork carefully before leaving the clinic as this is often where misunderstandings occur.

- For example, if TM is injured on a Friday, the provider could likely write that he/she may return to work on Monday. This would count as a lost time injury. You can assure the provider that the TM is not scheduled to work the weekend, but the paperwork must reflect a next day RTW under the OSHA guidelines.

Common Injuries and Helpful Hints:

Foreign Bodies in the Eye

- First try to remove the foreign body by telling the team member to blink several times. This will produce tears that may help to flush out the object.
- Have the individual flush the eye briefly.
- If the object remains, the team member should receive professional medical attention.
- If a physician identifies a foreign body, ask if it can be removed with a cotton swab. If not, it is recordable.
- Diagnostic drops to numb the eye or help locate a foreign body are not recordable.
- If it is not already recordable and the physician mentions antibiotic drops or ointment, we can suggest an over the counter lubricant (Lacri-Lube or Refresh Tears) or offer to bring the team member back for a follow up the next day to ensure that infection is not an issue. Do not pursue if the physician still feels antibiotics are necessary rather than the alternative you have suggested.

Muscle Strains and other Soft Tissue Injuries:

- Have team member stop performing any activities that could aggravate the injury.
- If the injury is of acute onset ice may be applied to the area.
- Set up an appointment for the team member at the pre-identified injury management clinic.
- If the physician mentions prescription medication we can ask if an over the counter medication would work at over the counter dosage supplemented with ice for swelling. Prescription medication (including samples) is recordable. Non-prescription painkillers (Tylenol, Advil, Aleve) prescribed in higher doses than recommended on the bottle is also recordable.
- If the physician mentions physical therapy, we can ask if massage therapy is an acceptable alternative. Even one session of PT or exercise “instruction” is recordable, as is a formal home exercise program. Many clinics now offer in house PT, so prescribing it from the first visit is becoming more common.
- If a splint is mentioned, ask if it is rigid. If so, ask if a non-rigid splint would work. If a non-rigid splint is agreed to, ask the doctor to write “non-rigid” on the M-1 so that we have documentation. Note: Finger protectors whether rigid or not, are not recordable.

Laceration:

- Control bleeding by using pressure and elevation. Apply direct pressure by placing a sterile dressing over the wound. Use appropriate personal protection.
- Take the TM for medical attention promptly if:
 - Opening that is over 2 cm in length or is deep.
 - Opening has gaping or jagged edges.
 - Embedded material is present or the laceration was made through material such as sleeve or glove or with a dirty object.
 - A cut producing a flap, a serious cut to fingers, hands, toes, and feet or over joints is present.
 - Laceration caused by human or animal bite.
 - Laceration is on the face.
 - Laceration has caused a functional disturbance. (e.g. finger won't bend or is weak - implies tendon laceration)
 - The bleeding won't stop.
 - Gross contamination is present.
- If the laceration is not severe and stitches are mentioned we can ask if steri-strips would be an acceptable option. Remember that stitches used for cosmetic reasons only are still recordable.

9.2 Appendix B

Basic Trade	Possible Light Duty Jobs	Limited Use of One Hand/ Arm in Cast or Sling	Restricted to Crutches	Lifting Restrictions	Seated Work Only	Office Environment Only	Limited Walking
	1. Track down daily/monthly equip inspection cards, forward to superintendent for review, keep a log of repairs separate so Pittsfield knows mechanic needs to be there	X		X			X
	2. CAPP observations	X	X	X	X	X	X
	3. Verify crews using current drawing revisions, check w/foremen on weekly basis	X	X	X	X	X	X
	4. Misc tool crib inventory support - look ahead so don't run out	X					X
	5. Misc office work, filing, etc.(within reason)	X	X	X	X	X	X
	6. Review consumable/supply charges (unit prices on grinding disks, etc.) comparing various suppliers to be used on the job	X	X	X	X	X	X
	7. Coordinate loading/unloading of crew gang boxes with fork truck operator during numerous mob/demob of crafts over course of job.	X	X	X			
	8. Clean equipment	X		X			X
7000	9. Rebar cap watch person	X		X			
5700	10. Designated crane tagger /spotter			X			X
5200	11. Overhead crane or tugger operator			X			X
5400/5500	12. Firewatch/Holewatch			X			X
	13. Pick up trash, sweep floors					X	X
	14. Security/gate attendant	X	X	X	X		X
	15. Rack truck, lull, forklift, or van driver			X	X		X
	16. Staging coordinator	X		X			X

Basic Trade	Possible Light Duty Jobs	Limited Use of One Hand/ Arm in Cast or Sling	Restricted to Crutches	Lifting Restrictions	Seated Work Only	Office Environment Only	Limited Walking
	17. Answer telephone – If one handed use a head set enabling notes to be taken	X	X	X	X	X	X
	18. Do daily fall protection system checks on cable rails, Controlled Access Zones, ratlines etc.	X		X			X
	19. Monthly fire extinguisher checks				X	X	X
	20. Fire watch/fire permit coordinator	X	X	X	X	X	X
	21. Pick up water bottles and make sure we get returnable money	X		X			
5600	22. Make up bolts for the ironworkers		X	X	X	X	X
5500	23. Cut gaskets for the pipers		X	X	X	X	X
	24. Check power cords and welding leads for damage in the field			X			X
	25. Keep cords and leads up off the floor			X			X
	26. Look for consumables that have been thrown away prematurely and get them back to the crib	X					X
54/5500	27. Wash coveralls on boiler jobs	X	X	X			
54/5500	28. Organize pipe and/or instrument conex boxes keeping them orderly	X		X			X
7000	29. Assist with grouting operations	X		X			X
7700	30. Touch up painting	X		X			X
	31. Inventory products and make sure an MSDS is on file/ Organize MSDS books	X	X	X			X
5700	32. Inspect and organize rigging making sure it stays up off the ground			X			X

Basic Trade	Possible Light Duty Jobs	Limited Use of One Hand/ Arm in Cast or Sling	Restricted to Crutches	Lifting Restrictions	Seated Work Only	Office Environment Only	Limited Walking
	33. Check personal fall protection equipment and ensure the current colored tie-wrap is on it		X	X	X	X	X
54/5500	34. Identify empty gas cylinders and facilitate getting them to the storage rack	X		X			X
	35. Heater watch	X	X	X			X
7000	36. Spray water during concrete demo	X		X			X
2400	37. Yard crew paperwork organizer/runner	X		X			X
7100	38. Back up concrete trucks to pump truck and sign and collect slips	X		X			X
	39. Paperwork or running for corporate or regional offices	X	X	X	X	X	X
	40. Data entry of asset tracking sheets	X	X	X	X	X	X
	41. Make up work packages	X	X	X	X	X	X
5100	42. Make tags for electricians	X	X	X	X	X	X
5600	43. Assist with instrument calibration	X		X			X
	44. Review activity plans and provide a summary to the site manager	X	X	X	X	X	X
	45. Data entry into BAPP Track	X	X	X	X	X	X
	46. Jobsite orientations	X	X	X	X	X	X
	47. Vendor coordination	X	X	X	X	X	X
	48. Subcontractor coordination	X	X	X	X	X	X
	49. Coordinate fuel, bottled gas, and other vendor deliveries.	X	X	X	X	X	X
	50. CAPP log entry	X	X	X	X	X	X
	51. Assist with training information	X	X	X	X	X	X

Basic Trade	Possible Light Duty Jobs	Limited Use of One Hand/ Arm in Cast or Sling	Restricted to Crutches	Lifting Restrictions	Seated Work Only	Office Environment Only	Limited Walking
	52. Make signs for Safety / laminate signs, tags	X	X	X	X	X	X
	53. Pictures for TM portals	X	X	X	X	X	X
	54. Write up notices for OMC calls	X	X	X	X	X	X
	55. Review all safety supplies, inventory what is on hand	X	X	X	X	X	X
	56. Air monitoring for confined spaces, other spaces	X		X			X
	57. Coordinate with HLP schedules / visits to site	X	X	X	X	X	X
	58. Coordinate with the hearing test van for site visit	X	X	X	X	X	X
	59. Assist with medical questionnaires	X	X	X	X	X	X
	60. Research for products/ materials needed	X	X	X	X	X	X
	61. Assist with receiving material/deliveries	X	X	X			X
	62. Put interview packages together	X	X	X	X	X	X
	63. Check references for personnel		X	X	X	X	X
	64. Jobsite photos	X		X			X
Remember to take into consideration that each case is unique, and each team member's abilities and skills may be different as well as the individual's work mods.							

Policy Number 039

Authorized By: Michael W. Bennett

Title: Life Saving Absolutes

Effective Date: 05/02/02

Page 1 of 5

1 Status

- 1.1 Update of existing policy, effective 02/05/15.

2 Purpose

- 2.1 To ensure the health and well-being of our team members and establish minimum compliance standards for the most severe hazards and life threatening situations.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the vice president of health, safety, environmental & human resources or the designee.

4 Definitions

- 4.1 OJT: On the Job Training.
- 4.2 Z.E.S.: Zero Energy State- Lockout/Tagout

5 Policy

- 5.1 We believe that the proper enforcement of disciplinary measures for violations of Cianbro's safety policies and procedures will reduce a team member's exposure to injury and illness.
- 5.2 Cianbro expects managers to administer immediate disciplinary actions for unacceptable behavior or safety violations proportionate to the severity of the violation.
- 5.3 Additionally, Cianbro expects managers to adopt a Zero Tolerance standard for violations of the following:
 - 5.3.1 Fall Hazards from Elevated Heights
 - 5.3.2 Zero Energy State
 - 5.3.3 Traffic Control of Vehicular Exposure to Work Area
 - 5.3.4 Control Access Zone
 - 5.3.5 All Operated Equipment & Vehicles
 - 5.3.6 Distracted Driving
- 5.4 We expect our supervisors to lead safe and efficient projects and to exercise good judgment in holding their team members accountable for safe behaviors. For all other safety related areas, unsafe behavior or violations, supervisors shall apply their best judgment to determine the appropriate measure of disciplinary action following Cianbro's Progressive Discipline Procedure in the Team Member handbook.

6 Responsibilities

- 6.1 The vice president of health, safety, environmental & human resources or designee is responsible to provide approval for any deviation from this policy unless spelled out specifically within the policy.
- 6.2 The senior level of Cianbro management on the job site is responsible for the implementation of this policy on the project.
- 6.3 Corporate Safety is responsible for maintaining this document.

7 Life Saving Absolutes Index

7.3	Most Severe Violations.....	3
7.4	Disciplinary Measures	4

7.1 At Cianbro safety begins at the highest level, filtering down through all levels of the company. All team members share equal responsibility for working smart and safely as a condition of their continued employment at Cianbro. All team members have the responsibility to ensure, and the right to request safe work conditions.

7.2 Because we care about the well being of people, Cianbro places a safe work environment as our number one value. The most desirable outcome to Cianbro is that every team member goes home to their loved ones in better condition than they came to work.

7.3 Most Severe Violations
Below are the minimum measures to be administered for our most severe violations.

7.3.1 Fall Hazards from Elevated Heights

Team members working where fall hazards exist as outlined in Cianbro's and/or host facility's fall protection program, not protected or secured from falling by one of the OSHA and Cianbro approved methods (guard rail system, safety nets or 100% tied off). Note: Any deviation from this requirement must have a written Job Hazard Analysis that must be approved by the vice president of health, safety, environmental & human resources or designee.

7.3.2 Zero Energy State

Team members not following Cianbro and/or host facilities Zero Energy State (Z.E.S - lock and/or tag out) program(s).

7.3.3 Traffic Control of Vehicular Exposure to Work Area

Team members not following the detailed site-specific traffic control/activity plan.

7.3.4 Control Access Zone

Team members crossing or removing red (danger) tape without permission from an authorized member of the crew performing work within the danger zone. Radiation tape is the same as red (danger) tape.

7.3.5 All Operated Equipment and Vehicles

- Team members knowingly operating equipment with faulty safety systems without the project manager's/superintendent's approval and an alternate Job Hazard Analysis in place.
- Team members operating equipment without proper certifications/licenses or not classified as a Novice Operator.
- Team members inappropriately using equipment and/or not following OSHA, Cianbro policies and the manufacturer's operating requirements.
- Team members operating equipment within the caution zone (usually defined as 20') of an overhead power line, without a specific activity plan that follows Cianbro procedures and has the approval of the appropriate levels of review.
- Operators who make unplanned contact with known (or should have been known) live utilities, whether they are overhead, underground, above ground, or concealed such as (live electrical, chemical, oil and gas, or other forms of distribution lines) without having taken all standard precautions.
- Team members performing critical lifts (loads > 75% chart capacity etc.) with hoisting equipment without completing the Cianbro "Pre-lift Checklist" with review and sign off. This applies to all equipment and situations for which a pre-lift checklist exists:
 - Pre-Lift Checklist Land Based Cranes Only (SD1004)
 - Pre-Lift Checklist Barge Mounted Cranes Only (SD1003)
 - Pre-Lift Checklist Procedures for Overhead Cranes/Power Hoist (SD1005)

- Boom Truck Critical Lift Plan (SD1034)
- Pre-Lift Checklist for Two Cranes (SD1039)
- Pre-Lift Checklist Manual Hoist Exceeding 75% of Rated Capacity (SD1038)

7.3.6 **Distracted Driving**

Team members engaging in any of the following prohibited distracted driving behaviors:

- Texting
- Any use of a cell phone's or smartphone's applications or features unless able to use hands-free.
- Programming of a phone's applications, features, or any other electronic device is prohibited while driving. Example: GPS, computer, IPOD, MP3 Player, or similar devices. Your normal car controls, climate, radio, etc., are approved to be adjusted while driving.
- Reading and writing while driving is prohibited.
- Eating a meal and personal grooming. Personal grooming can be very distracting as you are usually looking at your task, not the road. Eating while driving is prohibited unless it is a snack-like food or non-alcoholic beverage.
- CB's and two-way radios are approved to be used while driving and/or operating equipment. It is encouraged when moving in congested areas that you pull over to a safe location to use these devices.

All team members driving for any purpose related to their Cianbro employment or utilizing company issued electronic communication equipment to conduct personal business while driving must be hands free and are required to eliminate or mitigate distractions while driving. In addition, the use of personal cell phone or electronics on personal time while driving are not allowed on any Cianbro property, worksite or designated Cianbro parking areas unless hands free. Furthermore, Cianbro strongly encourages all team members to apply these safe driving practices while at home.

7.4 Accountability

Disciplinary Measures to be applied as a minimum for any violation listed as most severe:

- 7.4.1 **First Offense- At a minimum, one full week off** without pay (example: violation happened on a Wednesday so the team member is not eligible to return to work until the following Thursday after a time lapse of seven days) documented in writing on a counseling report (PD623C). Safe hours set back to zero. Removal of safe hour decal from hard hat. A Lesson Learned investigation will be completed by the project team and submitted to corpsafety@cianbro.com. If termination is warranted after this first offense the team member may be considered for work with Cianbro after 12 months; however, rehire requires the approval of the vice president of health, safety, environmental & human resources or business unit vice president. For equipment violations, the Team Member's certification to operate for that specific piece of equipment will be removed. Recertification will be required on the Team Member's own time following the 30 day suspension* and a completed endorsement form.

*The BU VP/GM and the vice president of health, safety, environmental & human resources may enforce stricter penalties depending on the individual situation.

- 7.4.2 **Second Offense (within one year from the first offense)** - Immediate termination documented in writing on a counseling report; safe hours set back to zero, and removal of safe hour decal from hard hat. Team member may reapply for work with Cianbro after 12 months; however, rehire requires approval of the vice president of health, safety, environmental & human resources or business unit vice president.
- 7.4.3 These minimum disciplinary measures can be increased up to termination of employment for the first offense if warranted by accumulative unsatisfactory performance or willful behavior because of the potential risk of serious injury or death upon approval by the vice president of health, safety, environmental & human resources or business unit vice president.

In order to ensure fairness in the process, any termination of a team member, due to an accountability issue, will require concurrence of the next highest level of authority. Any individual who feels they have not been treated fairly will be given the opportunity to discuss their situation with the vice president of health, safety, environmental & human resources or business unit vice president.

As a minimum standard: Any manager or supervisor who knowingly allows a violation or an unsafe practice as covered in this Life Saving Absolutes policy and procedure is subject to the same disciplinary action as the person in violation.

8 Budget / Approval Process

8.1 Not applicable.

9 Related Documents

9.1 References

011 Fall Protection Program
016 Zero Energy State Lock Out-Tag Out
028 Crane Safety
035 Work Zone Traffic Control
040 Work Area Barricade Protection
062 Distracted Driving

Policy Number 040**Authorized By:** Michael W. Bennett**Title:** Work Area Barricade Protection**Effective Date:** 01/28/02Page 1 of 4

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 Provide guidelines and requirements for the use of caution, danger and radiation tape to protect from specific hazards.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Caution Tape: Yellow tape with the word Caution written continuously along the tape. The tape is used to warn of a hazard inside of an area.
- 4.2 Radiation Tape: Yellow tape with magenta (purplish-pink) wording or radiation symbols continuously along the tape. The tape is used to warn of a radiation hazard inside of an area.
- 4.3 Red or Danger Tape: Danger tape has red as the predominating color background with the words "DANGER" all along the tape. This tape is to be used only where an immediate hazard exists inside the area that is barricaded off.

5 Policy

- 5.1 Barricade tape with tags shall be used where appropriate to warn and protect team members of existing hazards.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.
- 6.2 Corporate Safety is responsible for maintaining this document.

7 Work Area Barricade Protection Index

7.1	Caution Tape (yellow)	2
7.2	Danger Tape (red)	2
7.3	Radiation Tape (yellow/magenta)	3
7.4	Disciplinary Procedures / Enforcement	3
7.5	Safety At Home	4

Many construction projects require the barricading of areas to protect against hazards that are present. For example there may be work activities going on at upper levels where objects could fall potentially striking some one, tripping hazards, or radiation hazards. When planning for hazards you must also take into consideration other methods to protect from the hazard and do not just rely on signs and barricade tape as the first or only option. Tools, materials and equipment can be secured (tied off) to prevent them from falling to lower levels. Debris nets or shielding can be used to prevent demo materials from falling below. Toe boards or fully covered guardrail shielding could be installed along upper level walkways or floors. Trip hazards could be covered or removed. These options should be considered along with the use of barricade tape and informational barricade tags

There are three basic types of barricade tape generally found and used at construction sites and it is important to note the differences.

7.1 Caution Tape (yellow)

Caution tape has yellow as the predominant background color with the words "CAUTION" all along the tape. This tape is used to warn against potential hazards inside the area that is barricaded off. If there is an alternate route around the caution tape barricaded off area, then it should be used by those not associated with the specific activity. If it is necessary to enter or cross through the caution taped off area, then the barricade tag hanging off the caution tape must be read to understand what the hazards are inside before proceeding through. Only after clearly understanding what the hazards are should anyone cross through or go into an area that has been caution tape barricaded off. Never remove any caution tape or tags without the permission from an authorized member of the crew who is responsible for work being done within the caution taped off area.

7.1.1 Caution Tape Tag (yellow)

A Cianbro barricade tag must be completed and hung off all caution barricade tape being used by Cianbro crews. The tag should be placed at a location where persons other than the work crew inside the barricaded area will most likely see it. More than one tag may be necessary. The tag must be completely filled out with the name of the person putting up the barricade tape.

7.2 Danger Tape (red)

Danger tape has red as the predominant background color with the words "DANGER" all along the tape. This tape is to be used only where an immediate hazard exists inside the area that is barricaded off. Like the use of caution tape, if there is an alternate route around the danger tape barricaded off area, then it should be used by those not associated with the specific activity. If it is necessary to enter or cross a danger taped off area, then the barricade tag hanging off the danger tape must be read to understand what the hazards are. Only with permission from an authorized member of the crew who is responsible for work being done within the danger taped off area, is anyone allowed to cross through or enter a danger taped off area. Never remove any danger tape or tags without the permission of an authorized member of the crew who is responsible for work being done within the danger taped off area. **Never go into a danger taped off area without permission.**

- 7.2.1 **Danger Tape Tag (red)**
A Cianbro barricade tag must be completed and hung off all danger barricade tape being used by Cianbro crews. The tag should be placed at a location where persons other than the work crew inside the barricaded area will most likely see it. More than one tag may be necessary. The tag must be completely filled out with the name of the person in charge of the work activities working inside the barricade area. Also, the name of each member of the work crew must be listed on the backside of the barricade tag. Any authorized person, whose name is listed on the tag, may authorize other person's access inside the barricade area.
- 7.2.2 First line supervisors responsible for work activities requiring the use of barricade tape, must ensure they use the appropriate tape and tag "danger or caution" based on the activities to be performed, and include this in their activity plan. Proper installation of the tape and tags must be communicated to each member of the work crew performing the activities requiring the use of barricade tape. Each crewmember is responsible to ensure the integrity of the tape and tags is maintained and guard against unauthorized persons crossing into the taped off work area.
- 7.2.3 Barricade tape should be removed as soon as possible when the work and danger is past or completed.
- 7.3 **Radiation Tape (yellow/magenta)**
Radiation tape has yellow as the predominant background color with the words "Caution Radiation Area" and/or a radiation symbol in the color magenta all along the tape. This tape is to be used only where an immediate radiation hazard exists inside the area that is barricaded off. Like the use of caution and danger tape, if there is an alternate route around the radiation tape barricaded off area, then it should be used by those not associated with the specific activity. Only with permission from an authorized member of the crew who is responsible for work being done within the radiation taped off area, is anyone allowed to cross through or enter a radiation taped off area. Never remove any radiation tape without the permission of an authorized member of the crew who is responsible for work being done within the radiation taped off area. **Never go into a radiation taped off area without permission.**
- 7.3.1 When planning for radiation hazards at nuclear plants or if radioactive sources are needed for testing or x-rays, a competent person is required who can identify safe approach distances to radiation sources and place barricade tape accordingly.
- 7.3.2 **Tagging of Radiation Tape**
Since radiation tape is treated the same as danger tape, a red danger tag should be hung off all radiation barricade tape being used by Cianbro crews. The tag should be placed at a location where persons other than the work crew inside the barricaded area will most likely see it. More than one tag may be necessary. The tag must be completely filled out with the name of the person in charge of the work activities working inside the barricade area. Also, the name of each member of the work crew must be listed on the backside of the barricade tag. Any authorized person, whose name is listed on the tag, may authorize other person's access inside the barricade area.
- 7.4 **Disciplinary Procedures / Enforcement**
Team members (any Cianbro team member) crossing or removing red danger tape or radiation tape without permission from an authorized member of the crew who is responsible for work being done within the taped off area is subject to those consequences listed in Cianbro's Zero Tolerance - Safety Accountability Policy and Procedure.

REMEMBER, YOUR SAFETY IS OUR MOST IMPORTANT GOAL!

7.5 Safety At Home

Working safely at home is as important as it is at work, if you are doing work at home that could cause injury to other family members or neighbors the use of barricade tape to keep loved ones out of your work area. Take the time to explain or train so that those around your demolition, excavations or what ever type of work that you are doing at home so that they will stay out of the area when there is a danger of being injured.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

9.1 Not applicable.

Policy Number 041**Authorized By:** Michael W. Bennett**Title:** Water Rescue Safety**Effective Date:** 07/23/03Page 1 of 9

1 Status

1.1 Update of existing policy, effective 06/04/15.

2 Purpose

2.1 To provide general guidelines for rescue when team members are exposed to the risk of drowning.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 Apron: The area along the waterfront edge of the pier or wharf.

4.2 Bow: Front of vessel.

4.3 Draft: The portion of the vessel that extends from the water line down into the water.

4.4 Freeboard: The portion of the vessel that extends from the water line up out of the water.

4.5 Leeward Approach: Against the wind and/or current.

4.6 Navigable Channels: Any tributary between navigable waters that can support pleasure, commercial or trade vessels (rivers, streams, channels, canal).

4.7 Navigable Waters: Any inland or sea going waterways that can support vessels.

4.8 PFD: Personal floatation device.

4.9 PIW: Person in water.

4.10 Port Side: Left side of vessel.

4.11 Rescue Nets: Net that attaches to gunwale of rescue boats, to aid in PIW rescue.

4.12 Starboard Side: Right side of vessel.

4.13 Steering Speed: The minimum speed necessary to steer the vessel to make forward progress.

4.14 Stern: Rear of vessel.

4.15 Wake: The wave actions caused by a boat or vessel.

4.16 Water Manikin: Training aid for realistic water rescue drills available at Rickers Wharf tool department.

4.17 Windward Approach: With the wind and/or current.

5 Policy

5.1 All Cianbro projects working around water will have a site specific water rescue plan and run drills to prove the efficiency of the rescue team. Drills need to be conducted on each site. The team member must be rescued within four minutes from the time the person enters the water.

6 Responsibilities

6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy on the project.

6.2 Corporate Safety is responsible for maintaining this document.

7 Water Rescue Safety Index

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7.1 Planning

Site specific action plan – every job site with work activities around water where team members (or other persons after project) could be subject to drowning must develop a site specific, water rescue plan. See appendix A for sample plan.

7.1.1 Team members must be prepared and know what action to take should someone fall into the water. Rehearsing (drilling) how to react is vital to a successful and safe recovery operation. Rescue personnel must assume the person who is in the water may be unconscious, suffering from shock, and possibly injured.

7.1.2 The key to a successful rescue is preparation, practice and alertness. The action taken in the first few seconds after a team member falls into the water determines the success of the recovery. First actions should be swift and certain. Drills need to be conducted on each site, the team member must be rescued within 4 minutes from the time the person enters the water.

7.1.3 Notifications

- Coast Guard – The Coast Guard requires that any and all barges or vessel that may moor to potentially obstructing the navigable waters, shall notify the Coast Guard. A submitted plan may be required in some areas identifying location of barges and vessels. Contact your local Coast Guard Auxiliary for more information.
- Commercial Vessel – Commercial vessels have the right of way in navigable waters. It is suggested that you inform officials of these vessels, of your activities. Establish a meeting, and utilize a HOTLINE that provides the commercial vessel information of your daily activities.
- Notices to Mariners – Federal regulations require notification to mariners in writing of any activity that may/will disrupt navigable waters. Closures to navigable waters extended in excess of 12 hours require a 30-day prior notification to the Coast Guard for approval. Closures to navigable channels in excess of 12 hours require 60-day notification and approval from the Coast Guard.
- Other agencies may also require notifications such as DEP, EPA, OLISP, Army Corps of Engineers, local low environment authorities, and other agencies pending geographical location.

7.1.4 Activity Planning

Every work activity involving team members or others working around water where the danger exists of drowning, must include a water rescue plan in their activity specific plan. The general project specific plan should be attached (included in) to the activity specific plan. The team member briefing to review the specific activity plan should also include specific PPE hazards and solutions involving the possibility of someone falling into the water. Plus action items like:

- Use a notification signal to alert other team members that there is someone overboard;
- Who is the boat operator and who will be assisting the boat operator.
- Weather/environmental conditions think about wind, current and tide.
- Decide the recovery approach that is most affective for the situation (leeward or windward and starboard or port).

Each site needs to have a rescue boat, at the ready for in the event of PIW. Sites with only one boat will not use the boat as a work boat.

7.1.5 Drill/Exercise

If possible an organized drill/exercise should be held at the project site with local supporting agencies (Fire Department, Coast Guard, Special Rescue Personnel, etc.) If local agencies are not available for drill the project will still conduct drill with team member on site. If conducting drill without local agencies. Site will notify agencies that project will be conducting a drill and the time the drill will be conducted in case the public confuses the drill with an actual PIW. A water rescue manikin is available at Ricker's Wharf tool department as an aid for water rescue drill. This should also include nighttime rescue if work is planned in the evenings. Conduct a meeting after the drill/exercise to review what went well and what did not. Revise emergency planning as needed to correct any deficiencies.

7.2 Rescue

A team member shall be designated a sufficient number of persons trained to assist in the safe and orderly emergency evacuation and rescue of all persons at the project or who have fallen into the water. The action taken in the first few seconds after a person falls into the water decides the success of the recovery. An alert team member can do much to save the life of someone who might otherwise drown.

7.2.1 Assistance from shore (5 basic steps, do not move to the next step until you are sure that the step before will not work)

- Step one- Announce or signal alarm "Man over board!"
- Step two- Try to reach the team member use your hand or anything else that can be held onto such as a jacket, belt, rope, oar (do not pass the point end to a gaff to the victim)
- Step three- Throw something to the person that will float (life ring, PFD, rope etc.).
- Step four- If the person is to far away, use an object such as boat, canoe, surf board, raft, boogie board or anything else you can row in an effort to reach the person.
- Step five- Go to the person by swimming and only if you are a good swimmer and are trained in lifesaving techniques. If available tie a line to yourself, you may not have the energy to swim back. (Alternate is to go for help).

7.2.2 Rescue by Boat

- Call out repeatedly, "Team member in water!"
- Throw a ring buoy toward the side of the person in the water. (Do not throw the floatation object at the person, it could cause further injury if it hits the individual. Throw the object so that it or its line can drift down to the person while avoiding fouling the line in the propeller).
- Sound five or more blasts on the sound signal horn. This will alert other boats in the area that a danger exists.
- Rescue nets are available from Rock-N-Rescue Valencia, PA 1-(800)346-ROPE & Marine Rescue Technologies Sebastian, FL 1(772)388-1326. Nets can be attached to the gunwale of rescue boat and provide a two to one mechanical factor to pull a PIW into the rescue boat. They can also aid a PIW to self rescue if they are able. NOTE: Rescue net can be used on small rescue boats 14' to 16' to help hold onto PIW to the side of the boat and take them to shallow water for rescue. It is not recommended to use nets on smaller boats to pull PIW into boat because of the boat tipping factor.
- On approach of the individual the boat operator must inform the rescue crew on how the recovery will be made and whether it will be accomplished on port or starboard sides. The approach will be influenced by: wind, sea surface conditions, maneuverability of the boat, and maneuvering space restrictions.

7.2.3 Approach by boat

There are two methods of approach:

- The leeward approach (against the wind and current). See Section 9.2
- The windward approach (with the wind and current). See Section 9.2

Use a leeward approach at all practical times! A leeward approach provides the best control of the vessel and protection to the person in the water (PIW). Windward approaches are used in confined spaces or when a leeward approach is impossible.

- If rescue boat is equipped with rescue nets, deploy nets.
- Perform the leeward approach with the bow of the boat facing the greatest force of on coming resistance during the time of pick up. This condition could be wind, current, seas, or any combination of the three
- There will be times when the winds and current are from different directions. Select the heading, which provides the best control on the approach to the PIW. When the actual approach reaches the PIW, care shall be taken to slow the heading and prevent the wake of the boat from overcoming the PIW. When the PIW is on the side of the boat or recovery area of the boat the boat shall be dead in the water. Place the engine in neutral. Make all recoveries into the prevailing weather or sea conditions. Take care not to overrun the PIW or to have so much headway that the boat drifts beyond the PIW. If the PIW does drift beyond the boat, DO NOT BACK UP! The propeller could injure the person.

7.3 Recovery

The conditions of the PIW will dictate the type of recovery procedures used. On the condition of the PIW can be determined (i.e. conscious, unconscious, or injured). The rescue team will select one of the following procedures; generally, the pickup is completed at the lowest point of the freeboard and away from the propellers.

7.3.1 PIW Conscious and Uninjured

- Cast out line or life ring with a line to the PIW.
- Haul in the PIW to the side of the boat or recovery area of the boat.
- If the person needs assistance to board the boat, multiple team members can aid by each placing a hand under the PIW armpit using the other hand to hold onto the boat. Or if boat is equipped with rescue nets place PIW in net and use pull lines to roll PIW into rescue boat. In smaller boats it may be difficult to provide multiple team members to aid in the recovery and still maintain balance to prevent tipping the boat. Use rescue nets to hold onto PIW next to boat to bring them to shallow water for rescue.
- If only one person is available to lift the uninjured person from the water: the PIW shall be positioned facing the boat with their arms extended upwards. The rescue person should reach down with arms crossed and grasp the PIW's wrists. The rescue member should lift the PIW straight out of the water while simultaneously uncrossing their arms. This should extract the victim from the water in a corkscrew like motion.
- If the freeboard of the boat is too high to reach the PIW, use a line under the armpits in a horse collar fashion. The line should cross the chest, pass under each arm, and up behind the head. Try to pick the PIW straight up and out of the water, dragging the PIW back over may cause injury to him or her. Or if boat is equipped with rescue net. Use rescue nets to roll PIW into boat.

NOTE: A person is light in water due to buoyancy; once the PIW comes out of the water the person becomes "dead weight." Keep this in mind during recovery, so not to injure yourself or the PIW, or cause tipping of the boat. Rescue nets supply a two to one mechanical factor when bringing a PIW into rescue boat.

7.3.2 PIW Unconscious or Injured

- Quickly deploy a surface swimmer donned with a Personal Floatation Device (PFD) and tending line. Depending on water temperatures a wet or dry suit may be required.
- Swim to the PIW and if he or she is face down turn the PIW over making motions slow and easy.
- Wait for the EMS to arrive.
- If conditions do not allow for EMS use floatation equipped stokes litter to recover the PIW into the boat. This condition shall be used ONLY when the PIW is seriously injured and seas are calm.

7.4 Survival Techniques

- 7.4.1 Hypothermia – Hypothermia is a condition in which the body loses heat faster than it can produce it. This causes a dangerous reduction of the body's inner temperature. Hypothermia results from exposure to wind and wetness. Victims of hypothermia may become blue-gray in color. Violent shivering develops which may give way to muscle spasms and even loss of the use of arms and legs. Confusion and drunken behavior also indicate that a person may be hypothermic.
- To protect yourself from hypothermia, avoid the conditions that cause it. Dress warmly and stay dry. Wear a hat. Put on rain gear before it rains and wear a wool jacket. Wool traps body heat even when wet. Know the effects which wind has on cold weather. It may be 40 degree's (F) outside with the sun shining, but a 10-mph wind lowers the wind-chill temperature to 28 degree's (F).
 - Survival in cold water depends on many factors. Temperature of water, body size, fat and activity in the water. Large people cool slower than small people do and children cool faster than adults do.

7.4.2 Increase Chance for Survival

- Do not discard any clothing because it helps trap the body's heat.
- Do not move around unnecessarily, swimming or treading water, a person will cool about 35% faster than when remaining still. The average person wearing light clothing and a PFD may survive 2.5 to 3 hours in 50-degree waters by remaining still. Their survival time can be increased considerably by getting as far out of the water as possible and covering their head.
- Keep your head and neck out of the water. Most of your heat loss is through your head, neck, groin and sides.
- Assume the fetal, or Heat Escape-Lessening Posture (HELP).
- If there are several people in the water, huddling close, side to side in a circle will preserve body heat. Placing children in the middle of the circle will preserve body heat. Placing children in the middle of the circle will lend them some of the adult's body heat and extend their survival time.
- Get onto anything that floats (get out of the water).

HYPOTHERMIA CHART		
If the water temperature (F) is:	Exhaustion or unconsciousness	Expected time of survival is:
32.5	Under 15 minutes	Under 15 – 45 minutes
32.5-40	15 – 30 minutes	30 – 90 minutes
40-50	30 – 60 minutes	1 – 3 hours
50-60	1 – 2 hours	1 – 6 hours
60-70	2 – 7 hours	2 – 40 hours
70-80	3 – 12 hours	3 – Indefinitely
Over 80	Indefinitely	

7.5 Boating Safety Education Requirements

7.5.1 Cianbro Small Boat Operator Certification: In order to operate a Cianbro boat you must be certified by Cianbro.

7.5.2 Other Boating Safety Certifications That May Be Needed

- Some states such as Connecticut, Maryland and New York have boating safety education laws designed to assure that the younger generation of boaters have fundamental knowledge of boating rules and safety and that eventually all boat operators will be operating their boats with a basic level of boating education. Maryland law also imposes the requirement for persons convicted of certain boating violations, to successfully complete a boating safety education course, regardless of the age of the operator.
- A course 8 to 10 hours in length or an equivalency examination is required in order to receive a valid certificate to operate a powerboat in Maryland. Information on Maryland requirements can be obtained by calling (410) 260-3280 or the US Coast Guard 1-800-336-BOAT.
- A course 8 to 10 hours in length or an equivalency examination is required in order to receive a valid STATE OF CONNECTICUT certificate of personal watercraft operation. Information on Connecticut requirements can be obtained by calling Connecticut Department of Environmental Protection Marine Headquarters 333 Ferry Rd., Old Lyme, CT 06791 (860)434-8638 or the US Coast Guard 1-800-336-BOAT.

7.5.3 Other states may also have boating safety laws and special requirements.

7.6 Safety At Home

All states have different rules and regulations on safe boating. PLEASE: check the safe boating requirements in the state you are operating any watercraft.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and to provide necessary training.

9 Related Documents

9.1 See attachments.

Sample
Project Specific

Cold Water Rescue Plan

Description of Job: Cut out a section of 24" pipe out of the seawater out-fall line coming out of building 2. We will be replacing it with a new spool piece that comes with some type of flow meters that has to be in place by May 1st. Then we will demo out the existing steel structure around it and replace it with a new stainless platform and pipe support.

Proposed Rescue Plan: We will have a boat and motor ready for use in the water during work activities. We will start the motor twice a day to insure that it is in running condition. We will start it before start of each workday and again after lunch (if it has not been used that day). The boat will be tied up at a nearby pump house which has ladder access down to the water. We will have a life ring buoy with 90 feet of rope hanging on the nearby handrail adjacent to the job area. All team members working in this area will be required to wear a Coast Guard approved life vest with an attached whistle. All team members will also be tied off to a ratline that we will install. We will be following our Cianbro Safety Policy and Procedure for working over near water. This plan will be attached to the activity plan. We also plan to have plant radios available for use. This will give us direct contact with the building 2 operators and their emergency response team. One radio will be placed in the on-site Cianbro trailer and one at the work location.

Our daily plan will be to contact the local Coast Guard station to keep them informed of our work activity around water. We will call them again at the end of our shift to let them know that we have stopped work for the day. In the event of a person over board, our first response will be to begin our own rescue procedures using the life ring and the rescue boat. Our procedure will include using the ring and/or boat to pull the person to the ladder so she or he can climb up. If the person is unable to climb up on their own, a tripod will be used to hoist them up. We will not attempt to pull the team member into the boat as this may create a capsizing situation. We will start additional rescue procedures by calling the Coast Guard. Once the team member is out of the water we will quickly get them inside one of the buildings with heat and nearby blankets. We will then call the local fire department to get medical help for the team member if necessary.

Access: The job site, for the most part, is an all-flat service area. You can access the work area from a number of different ways – through buildings and by the walkway around building 2. We plan to use a ladder to access down to the ocean floor when we need to and also to get down to working platform. The work platform will be constructed of planks, new and existing steel. (Attached drawing shows diagram of sit and work area).

Scope of Work: Go over job with team members by using our activity plan to assure that all team members are comfortable with the scope of work. Plans are to prefab most of the new platform during the week before the shutdown. Install new drop legs so, along with existing steel, we can make a working platform. Then we will unbolt flanges on the 24" pipe and take out the section needed to install a new spool piece. Once the new spool piece is installed we will then continue to finish out the steelwork. All of the steelwork will be set with our fork truck with an attached lifting boom. Once the job is complete we will demobilize the area.

Leeward/Windward Rescue Approach Method

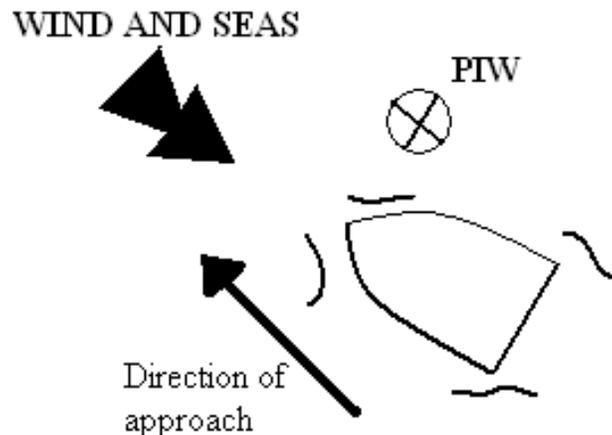
Rescue personnel must select an approach that is suitable for the existing conditions. There are two basic approaches:

- A leeward approach - against the wind and current
- A windward approach – with the wind and current

Leeward Approach:

Perform the leeward approach with the bow facing into the greatest force of oncoming resistance at the time of pickup. This may be the wind, current, seas, or any combination of the three. There are times when the wind and current are from different directions. Select the heading, which will best ease the approach. The approach must be made rapidly but as the boat nears the person you must slow the boat and reduce your headway. The person in the water should be next to the recovery area on the boat and the boat should be dead in the water. Place the engines in neutral. When the person is overboard alongside the boat, have a crewmember make the recovery. Make all pickups into the prevailing weather and sea conditions. Take care not to overrun the person overboard or to have so much headway on that the boat drifts beyond the person overboard. If the person in the water does drift aft of the boat, do not back down to effect the recovery. The propeller could injure the person.

Placing person in the water on leeward side of boat on approach



Windward Approach:

Perform the windward approach when the wind is coming from behind the boat. Use the windward approach when the person overboard is in a confined space or a leeward approach is impossible. However, avoid a situation where the boat can not turn into the wind. The operator must maneuver into a position upwind and up current from the person overboard, place the engine in neutral and drift down to the person. Ensure that the boat drifts so it places the person overboard along the "recovery" side but do not allow the boat to drift over the person.

Policy Number 042**Authorized By:** Michael W. Bennett**Title:** Automatic External Defibrillators (AEDs)**Effective Date:** 12/18/03Page 1 of 10

1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 This policy provides the requirements for obtaining, maintaining, and using automatic external defibrillators at Cianbro projects and sites.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Automatic External Defibrillator (AED): A device intended to be used by lay-persons who have the appropriate training to administer a shock to a person who is experiencing Sudden Cardiac Arrest.
- 4.2 AED Site Coordinator: A Cianbro team member who is responsible for:
- Check state laws and requirements for AED use prior to use on the job site.
 - Organize training and regular retraining programs for all users.
 - Ensure all units are properly stored.
 - Maintain all equipment and supplies and ensure unit is properly maintained after any use
 - Maintain all records (training rosters, call reports, maintenance records, inspection records, etc.).
 - Forward all incident data and the data card to Cianbro's Medical Director.
 - Write and revise the site specific written plan and procedure in accordance with Cianbro and state requirements.
 - Ensure an adequate number of trained users available on each shift.
 - Conduct a site evaluation with the site supervisor or safety specialist.
 - Ensure all personnel on site are trained in how to recognize the need and how to notify trained users when an AED is required. Include in orientation and cover in safety meetings.
 - Notify local emergency services of presence, location, and use of AED.
 - Include the AED information in the site Hazwaste/Hazmaterial (Emergency Plan) Contingency plan.
 - Post-Incident, notify Corporate HR for assistance in determining the appropriate level of EAP support.
- 4.3 AED Determination: A Cianbro Project Manager and/or Safety Specialist is responsible for determining: A Cianbro team member who will be responsible to help decide which sites to place AEDs, do a site analysis prior to placing the AED, ensure necessary training and retraining is completed for all users, ensure proper drills and case scenarios are done at each site, ensure units are properly maintained.
- 4.4 Cianbro Medical Director: The physician retained by The Cianbro Companies to oversee the Pre-Employment Medical Testing, DOT Medical Program, Healthy Lifestyles Program and this AED Program.

- 4.5 Sudden Cardiac Arrest (SCA): A medical condition where a person's heart stops and will result in death within 4-6 minutes without intervention.
- 4.6 Zoll AED Plus: The AED approved for use in the Cianbro Companies and available for site deployment through Pittsfield Supply. Cianbro's Medical Director and Corporate Safety must approve the purchase of any AED model other than Zoll AED Plus.

5 Policy

- 5.1 Automatic Defibrillator use is approved at Cianbro locations as long as all requirements outlined in this policy are met.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for the use of AEDs under this policy.
- 6.2 The top Cianbro manager of the job site is accountable for the implementation of this policy on the project.
- 6.3 The site AED coordinator is responsible for the administration of this policy on the project.
- 6.4 Corporate Safety is responsible for maintaining this document.
- 6.5 Cianbro's Medical Director and Corporate Safety must approve the purchase of any AED model other than Zoll AED Plus.
- 6.6 The Regional Office and the AED site coordinator is responsible for identifying at which sites to place AEDs and to make sure each site meets the requirements of this policy.

7 Automatic External Defibrillators (AEDs) Index

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7.1 During Sudden Cardiac Arrest (SCA) the victim immediately becomes unresponsive, stops breathing, has no pulse and will die within minutes without intervention. The chance of survival decreases by approximately 10% with each minute that passes after SCA. The response time of Emergency Medical System (EMS) responders can be more than 10 minutes. Use of an AED does not replace the care provided by emergency medical system responders, but is meant to provide a lifesaving bridge during the first few critical minutes it takes for EMS responders to arrive. The following defines the program and procedures required to use an AED on a Cianbro job site.

7.2 Required AED and Accessories

7.2.1 The Zoll AED Plus is stocked at Pittsfield Supply.

7.3 Use

The decision to obtain an AED on a job site is a joint decision between the job and the regional management team. If the decision is made to deploy one or more of these units then the following steps must be taken:

7.3.1 Identify a site AED coordinator who will be responsible to:

- Check state laws and requirements for AED use prior to use on the job site.
- Organize training and regular retraining programs for all users and ensure an adequate number of trained users are available on each shift.
- Ensure all units are properly stored.
- Maintain all equipment and supplies and ensure unit is properly maintained after any use.
- Write and revise the site specific written plan and procedure in accordance with Cianbro and state requirements.
- Ensure all personnel on site are trained in how to recognize the need and how to notify trained users when an AED is required. Include in orientation and cover in safety meetings.
- Notify local emergency services of presence, and location of the AED.
- Include the AED information in the site Hazwaste/Hazmaterial Contingency Plan (Emergency Plan).
- Incident debriefing. Notify the Corporate HR Manager of the incident. They will help determine the appropriate level of EAP involvement.
- Maintain all records (training rosters, call reports, maintenance records, inspection records, etc.).
- Forward the incident data card to Cianbro's Medical Director.

7.3.2 Develop a site specific written plan. See Appendix A for a sample plan. The plan shall include:

- Identity of the site AED Coordinator.
- Method to be used on site to notify trained users to respond with the AED.
- Location of the AED unit(s).
- Names of trained users.
- Duties of AED Coordinator and trained users.
- Maintenance and inspection procedures.

- PPE and supplies to be kept with the unit (gloves, mouth barrier device, antibacterial hand cleaner, scissors, razor, towel, gauze, tape, 1st aid kit, biohazard clean up kit, etc.).
- Any state specific requirements or protocols.

7.3.3 **Contact local EMS responders to inform them of the AED deployment.** This must be included in the site contingency plan (emergency plan).

7.3.4 Users must agree to comply with medical review of events and participate regularly in training updates and quality assurance measures.

7.4 Training

7.4.1 All AED users must be trained in the following at a minimum:

- Basic CPR (American Heart Association or equivalent).
- How to use the AED unit. Note: Must be a certified training program taught by a certified trainer such as through the American Heart Association or equivalent.
- Refresher training bi-annually including repeat of the initial AED training and CPR.
- Routine drills at least annually including documenting response time on the Training Attendance sheets and doing case scenarios.

7.5 Medical Direction

7.5.1 Cianbro's Medical Director provides general medical direction for the program.

His duties include:

- Approval of AED units along with Corporate Safety of any AED model other than Zoll AED Plus.
- Review of all incidents where AED was deployed
- Assist site and regional AED Coordinators in training and in establishment of cooperative agreements with local EMS when needed
- Bi-annual review of records including training rosters, call reports, maintenance records, inspection records, etc.
- Establish patient care protocols as needed

7.5.2 In Massachusetts, users must establish medical direction with a local emergency physician and follow protocols as directed in addition to the Cianbro guidelines.

7.5.3 In all states, local EMS personnel must be contacted prior to placing the unit in use. (See Section 7.3.5)

7.6 Quality Assurance

7.6.1 Following all events (deployment of AED unit) users must forward the Data Card, call reports, and any other information to Cianbro's Medical Director for review.

7.6.2 Cianbro's Medical Director will provide feedback to the users for all events.

7.7 Maintenance and Inspection

7.7.1 Do daily visual check of green status indicator on the unit.

7.7.2 Conduct a full inspection of unit and supplies monthly and document. See 9.5 Appendix E for a checklist that can be used.

7.7.3 In all cases, follow all required maintenance and inspection procedures contained in the operating manual for the unit that you have.

7.7.4 The AED must be stored within the proper temperature range:

- High 50° C or 122° F
- Low 0° C or 32° F

8 Budget / Approval Process

- 8.1 Contact Pittsfield Supply and requisition the unit.
- 8.2 The cost of renting the AED from Pittsfield on a site is the responsibility of that site.
- 8.3 Maintenance of the AED and periodic protocol updates is the responsibility of Pittsfield Supply.

9 Related Documents

- 9.1 See attachments.
- 9.2 Documents available on tm.cianbro.net

Call Report	SD1014
Trained Users On Site	SD1016
Monthly Inspection AED Inspection Record	SD1015

Sample Program

Cianbro Corporation

(Project name here)

Site Specific Automatic External Defibrillator (AED) Plan and Procedure Manual

Introduction

Sudden Cardiac Arrest (SCA) is the largest cause of natural death in the United States, causing about 325,000 adult deaths each year. Currently the survival rate for victims outside of a hospital is 5%. The presence of AED's and CPR trained personnel raise that survival rate to over 90% for ventricular fibrillation caused SCA. For every minute treatment is delayed the survival rate drops 10%.

The following procedures were assembled to ensure that the AED at this site is working, gets to the victim in the shortest possible time and is operated by trained personnel. It also ensures that the operation and maintenance of the services and equipment used at this job site and the responsibilities of personnel associated with the AED Service are in compliance with requirements of the State we are located in, protocols established by Cianbro's Medical Director, and manufacturer's guidelines.

Medical Direction

1. Cianbro Corporation's Medical Director will serve as the Medical Director of this Program. Responsibilities include the following:
 - Establishment and maintenance of the guidelines for care included in this protocol.
 - Ensures quality assurance and compliance with procedures.
 - Ensures that users are properly trained.
 - Conducts an annual review of program paperwork (training, procedures, QC, maintenance, inspections, etc.)
 - Assists site AED Coordinators in the establishment of cooperative agreements with the Company and local EMS agencies.
 - Functions as a resource for the initial training and continuing education programs for the Company's personnel.
 - Approves procedures to assure the continued competency of Company personnel to include periodic training and annual skill proficiency demonstrations.
 - Periodic review of Company activities as they relate to patient care.
 - Establishment of any other rules or activities needed to ensure the delivery of patient care within the Company's scope of practice.
 - Cooperates with local public service agencies for the purpose of carrying out routine quality assurance programs that relate to the Company's activities.
 - Bi-annual review of records including training rosters, call reports, maintenance records, inspection records, etc.

Site AED Coordinator

1. The AED Coordinator is the primary liaison between the Project's AED program, and the Medical Director. This person has the following general responsibilities:
 - Maintain all equipment and supplies.
 - Organize training programs and regular re-training programs.
 - Maintain all training records and Call Report/Patient Care Records for a minimum of 5 years.
 - Forward all incident data and information to Cianbro's Medical Director.
 - Ensure that the AED is properly maintained after any use.
 - Maintain and revise the procedure manual in accordance with state regulations and cooperation with program's Medical Director.
 - Renew state registration for the program if required by state regulations.
 - Maintain all equipment inspection and maintenance records, financial records (as applicable), QC and supply records.
 - Maintain adequate coverage (numbers of trained users) for the site.
 - Ensure team members understand who to contact if an AED is needed.
 - Schedule annual reviews as per procedure with Cianbro's Medical Director.

- Notification, keeping current location and extent of its operations to the local EMS agency with primary responsibility for providing emergency response and ambulance transport services.
 - Fill out the review section of the Call Report/Patient Care Record.
2. The following person will serve as the AED Coordinator at this Project:
- Name: _____

Trained Users

1. Trained Users have the following responsibilities:
 - Successfully complete a certified AED American Heart Association course (or equivalent) and be currently certified in Adult CPR/AED. Any individual currently licensed as a First Responder, Emergency Medical Technician or an equivalent approved by the Office of EMS shall be deemed as meeting this training requirement.
 - Comply with all federal, state, and/or local laws applicable to their operations.
 - After an incident, complete the AED Call Report/Patient Care Record and turn the completed paperwork into the AED Coordinator within 24 hours.
 - Attend a review course annually in order to retain status as a trained user
2. The following individuals on this site have received AED training:
See Appendix A

EMERGENCY PROCEDURES

In case of emergency initiate the Cardiac Chain of Survival:

1. Early Recognition & Early Access ***Activate Emergency Response***

- Make sure the scene is safe.
- Tap shoulder and shout; Are you OK?
- If the victim doesn't respond, yell for help
- Call or have someone call 911 immediately.
- Delegate someone to get the AED and the first aid kit.
- Provide the 911 dispatcher with location, emergency details and notify them that an AED is being deployed. Do not hang up until the dispatcher hangs up.
- Designate one person, if possible, to lead the EMS responders to the victim.

Check for breathing

- Make sure the person is on a firm, flat surface.
- Check for breathing.
- If the person isn't breathing at all or is only gasping, give CPR.

2. Early CPR **Push and give breaths. Give 30 compressions and 2 breaths.**

Compressions:

- Move clothes out of the way.
- Put the heel of 1 hand on the lower half of the breastbone. Put the heel of your other hand on top of the first hand.
- Push straight down at least 2 inches at a rate of at least 100 compressions a minute.
- After each compression, let the chest come back up to its normal position.
- Compress the chest 30 times.

Breaths:

- After 30 compressions, open the airway with a head tilt-chin lift.
- After the airway is open, take a normal breath.
- Pinch the nose shut. Cover the mouth with your mouth.

- Give 2 breaths (blow for 1 second each). Watch for the chest to begin to rise as you give each breath.

AED:

- Use it as soon as you have it.
- Follow the AED prompts.

Continue CPR until:

- Scene becomes unsafe.
- You find a sign of life.
- AED is ready to use.
- You are too exhausted to continue.
- Another trained responder arrives and takes over.

3. Early Defibrillation

When the defibrillator arrives:

- Place the AED near head of patient on same side as the rescuer.
- Turn on the AED.
- Remove shirt and any other garments covering the chest. Prepare the chest (shave chest hair & dry the chest if wet).
- Follow the AED's verbal and visual prompts.
- Apply electrodes to upper right chest just under the collarbone and lower left side on the ribcage below the breast (following drawings on pads). Note: the Zoll AED Plus units are all one piece.
- Stand clear and allow the AED to analyze.
- If indicated, deliver shock by pressing the shock button.
- If no shock advised perform CPR for 1 minute.
- Stand clear; let the AED reanalyze the rhythm.
- Continue care per AED Treatment Algorithm.

AED Precautions:

- Do not touch the victim while the AED is analyzing or defibrillating.
- Do not use the AED on a victim lying on a conductive surface such as metal deck or water.
- Ensure that the pads make good contact with the skin. Shave chest hair and dry the chest if necessary.
- Do not use alcohol to wipe the chest.
- Do not use a cellular phone or radio transmitter within 6 feet of the AED.
- Do not use the AED around flammables such as gasoline.
- Do not use the AED in a moving vehicle.
- Do not use the AED with regular pads for a child under 8 or under 55 pounds.
- Remove nitroglycerin pads from chest with gloved hands before using AED. If unsure of pads or patches remove any (nicotine) patches.
- Check the pads to make sure the gel has not dried out.

4. Early Advanced Care Life Support

Responders working on the victim should communicate any important information to the EMS responders such as:

- Victim's name.
- Any known medical problems, allergies or medical history.
- Time the victim was found.
- Number of shocks delivered.
- Length of time defibrillator has been used.
- Level of your first aid training and other relevant training, certification, or education (examples include R. N., Medical Technician, basic CPR course etc.)

EQUIPMENT

The following AED units are located at this Project:

Make & Model	Location	Serial #

MAINTENANCE

Daily

Perform a check of the status indicator daily. A green checkmark indicates that the AED is ready for use. Call the AED Coordinator if you see anything other than a green checkmark.

Person responsible: _____

Monthly

The AED Coordinator will complete the AED Inspection Form on a monthly basis and ensure that deficiencies are corrected.

After Use

1. The AED Coordinator will do the following after any AED use:
 - Notify the Medical Director.
 - Remove Data Card and send to Medical Director.
 - Conduct team member incident debriefing, as needed.
 - Restock any used electrode pads, batteries, PC cards, or gloves. Inspect unused supplies for any damage or old expiration dates.
 - Label and retain PC cards from patient care episodes for a minimum of 5 years.
 - Remove and replace battery in the AED and do a Battery Insertion Test (BIT) prior to replacing the AED into service.
 - Inspect the exterior and connector for dirt or contamination. Clean the AED if needed. Review User's Guide for list of appropriate cleaning agents.
 - Check the green Status indicator, if it can be seen the unit is ready to go.
 - Ensure all supplies, accessories and spares are present and are in operating condition. Check expiration dates and any obvious signs of damage.

Supplies

1. The following supplies should be kept at the AED location:
 - AED.
 - Two sets of electrodes.
 - Installed battery and one spare.
 - Installed PC data card and one spare.
 - Mouth barrier device.
 - Two sets of gloves.
 - Waterless hand wash.
 - Scissors.
 - Razor.
 - Hand towel.
 - Carrying case.
 - First Aid Kit.
 - Biohazard Clean-up Kits.

CPR & AED Process for Adults

Action	Adult
Check for response	Tap and shout.
Phone your emergency response number (or 911)	Phone your emergency response number (or 911) as soon as you find that the person does not respond.
Give compressions	
Compression location	Lower half of the breastbone.
Compression method	2 hands.
Compression depth	At least 2 inches.
Compression rate	At least 100 a minute.
Sets of compressions and breaths	30:2
Open the airway <i>Use the head tilt-chin lift</i>	Head tilt-chin lift.
Check breathing	Look for only gasping or no breathing. (take at least 5 seconds but no more than 10 seconds)
Start CPR	Give sets of 30 compressions and 2 breaths (1 second each).
AED • Press the ON button	Use the AED as soon as it arrives. Follow all prompts the AED machine gives.
Attach pads to the person's bare chest	Properly place the pad unit on person's bare chest.
Follow the AED prompts	

Note: Do not shock person if lying on a conductive surface such as a steel deck or if lying in water.

Policy Number: 043**Authorized By:** Michael W. Bennett**Title:** Marine Operations**Effective Date:** 12/19/06Page 1 of 22

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To provide guidelines and the minimum requirements for performing work safely on and around water.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Bit: An anchorage point designated for securing lines (rope) during toe or at mooring.
- 4.2 Bow: Front of vessel.
- 4.3 Buoy: A floating object marking the navigable limits of channels, sunken dangers, isolated rocks, telegraph cables etc.
- 4.4 Channel:
 - 1. That part of a body of water deep enough for navigation through an area otherwise not suitable. It is usually marked by a single or double line of buoys and sometimes by range markers.
 - 2. The deepest part of a stream, bay, or strait, through which the main current flows.
 - 3. A name given to a large strait, for example, the English Channel.
- 4.5 Gangway: A narrow portable platform used as a passage, by persons entering or leaving a vessel moored alongside a pier or quay.
- 4.6 Mooring Line - A cable or line used to tie up a ship.
- 4.7 PFD: Personal Floatation Device.
- 4.8 Pile: A wood, metal or concrete pole driven into the bottom. Craft may be made fast to a pile; it may be used to support a pier (see Piling) or a float.
- 4.9 Port Side: Left side of vessel.
- 4.10 Starboard Side: Right side of vessel.
- 4.11 Stern: Rear of vessel.
- 4.12 Wake: The wave action caused by the boat or vessel.

5 Policy

- 5.1 Cianbro, subcontractors and all others in our controls shall follow this policy as a minimum standard while complying with local, state and federal regulations.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for approving deviations from this policy.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.

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7.1 Planning

All Cianbro work activities require a written activity plan. Refer to 053 Work Activity Planning for how to do effective activity plans.

7.1.1 No team member is permitted to work alone when working over or near water.

7.2 Environmental

(Spill prevention and containment, fueling of equipment, biodegradable oils)

7.2.1 First priority: The first priority after team member safety is to keep all fuels and chemicals (spills) from reaching the water.

7.2.2 Fuel quantities: Limit amount of fuel and chemicals present on barges as much as possible to reduce the chance of spills to water.

7.2.3 Containment: Put equipment and fuel (or chemical) storage into secondary containment. Double wall tanks are also acceptable.

7.2.4 Fueling: Develop fueling procedure for any equipment on barge designed to prevent any spillage.

7.2.5 On shore: Store fuel or chemicals in areas where it can't enter the water or storm drains and don't fuel equipment near the water or storm drains.

7.2.6 Spill kits: All barges must have a spill kit with sufficient spill materials for the size of the potential spills. Evaluate the potential spills and make sure you have adequate spill material immediately available for potential spills.

Note: Speedi-dry should be avoided as it soaks up oil then can get blown or washed over the side. Use pads and sausage booms to totally stop any escaping oil.

- 7.2.7 Spills into water: If the spill reaches the water or could reach the water, immediately deploy a boom to contain the spill. Do not use spill dispersants as this is illegal.
- 7.2.8 Hydraulic oil: All hydraulic equipment, used on or around the water must use biodegradable hydraulic oil. Currently, Cianbro is using Chevron Clarity Hydraulic Oil AW 46 highly refined mineral oil. This product is considered to be inherently biodegradable, but does not meet the definition of readily biodegradable. This requires the same spill response as any other spill (contain the spill, report the spill, and clean it up).
- 7.2.9 Spill notification: Every site is required to develop a site-specific spill plan that includes all prevention, response, and notification procedures. The site must report all spills to the corporate health and environmental manager (within 30 minutes) at (207)-679-2245 or (207)-416-9579 and to the specific state environmental department immediately following. **Any spill that reaches the water (or is likely to reach the water) must also be reported to the National Response Center (1-800-424-8802) as soon as possible.** Note: Sites that have >1320 gallons of oils and fuels on site (only count containers 55-gal or larger not including equipment fuel tanks) must develop a Spill Prevention Countermeasure and Control (SPCC) plan. Contact the corporate health and environmental manager for guidance. Refer to SD1018 Bulk Fuel Tank Monthly Inspection available out on Cianbro.net/Resources/Forms.

7.3 Equipment

(securing to barge)

- 7.3.1 Cranes and aerial lifts: These must be secured to the barge deck (refer to the Crane and Elevating Work Platform Safety Policy and Procedures).
- If cranes are used for dredging, they need to be solidly anchored using four point tie down with turnbuckles and vertical beams with knee braces welded down at each end of the tracks.
 - If using a “shower curtain” type of tie down because the crane has to move, make sure the cables are of adequate size with appropriate clips. Don’t leave any more slack than is necessary.
 - Once a crane is in place after a move it is good practice to secure it in place more solidly.
- 7.3.2 All other wheeled equipment: Equipment needs to be secured to the barge deck as well to prevent movement if the barge lists causing the deck to tilt.
- 7.3.3 Barges under tow: When the barge is to be towed outside to another job, thoroughly secure all items on deck and inspect the barge before towing (usually a marine surveyor will be required). Anything not adequately secured could end up overboard taking other equipment with it. If possible, remove equipment from the barge, truck all equipment to the new job site and reload the barge there, rather than taking a chance of losing it off the barge in bad weather. The barge will tow faster if it is unloaded as well.
- Any gear with wheels should have the wheels removed and secured down with chains and binders fore and aft.
 - Conex boxes should have 1 foot high angle irons welded to the deck at each corner and a cable (or two) over the top.
 - Spuds should be taken out and laid down on the deck with steel beams secured to the deck beside them to keep them from rolling.
 - Cranes need to be secured in all four directions with heavy cable, turnbuckles and heavy beams welded to the deck. The boom should be secured in a cradle if possible and the counterweight cross-chained to the deck.
 - When welding pad eyes to the deck to secure to, make sure they are over a cross member and not just to the deck plate.
 - Items that should not get wet or ice covered should be placed in the middle of the barge. Spray can soak the forward 20-30 feet of even a high barge when plowing into seas.
 - Sometimes a “plow” is welded on the bow of a low barge for towing. This is a V-shaped piece that pushes the water over the side instead of covering the barge.

Note: It is important to do all the preparation and securing you can before you sail to prevent you from having to go aboard in bad weather.

7.4 Barge Access

(from shore, from another barge, from a boat)

7.4.1 Barge to fixed structure or land access: Because the barge is floating and the fixed structure is not, we must account for tide and/or waves. Only one end can be secured to allow for changes in water level due to the tide. The end on the barge typically is allowed to move while the other end is fixed. The walkway/gangway should be at least 24 inches wide. Provide handrails if there is a fall greater than 6' and provide traction on ramps if they could get steep or slippery. The length of the walkway should be at least 3 times the rise to ensure it is not too steep.

7.4.2 Barge to barge access: Provide access between barges if there is a 19" difference in height and/or the gap between the barges is 12" or more. Provide hand rails if more than 6' to water and there is a gap between the barges of 12" or more. Walkways should be at least 24 inches wide. Secure the walkway on one end.

7.4.3 Boat to barge access: Provide access from the water level to the deck level with ladders or other methods. OSHA requires a ladder that reaches from the deck to the surface of the water. Ladders need to be fixed ladders attached to the barge, but can be designed to be easily removable held in place by pipe sleeves attached to the deck. A best practice is to use floating stairs (stairs built on a float that provide place to tie boat up and allows you to walk up the stairs rather than climbing a ladder.

7.5 Small Boat Selection

7.5.1 Appropriate size and stability:

- Work with the equipment group to choose the right boat for the specific application and conditions that could exist at the job site. A rule of thumb test for small boats is to consider if you could rescue an unconscious person with two or three people in the boat under the conditions (water and weather) that are expected at your location.
- Most of the damage to small boats comes from inadequate berthing. Mooring of boats should include having fenders in place, being tied up both fore and aft, and taking into account the tides, currents and wind.

7.6 Training

7.6.1 Small boat operator certification: Cianbro has developed a small boat operator certification the same as for any other piece of equipment (such as an aerial lift). In order to operate a Cianbro boat without the supervision of another certified operator, you must be certified by Cianbro. The training consists of classroom training and a hands-on certification. The Coast Guard Safe Boating class is acceptable for the classroom piece but all Cianbro small boat operators must be checked out by a qualified Cianbro-certified small boat operator. As with any other piece of equipment, we must ensure operator are trained how to safely operate a small boat. Hard hat sticker will be issued to certified operators.

7.6.2 State boat operator requirements: In addition to Cianbro's training requirements, many states require small boat operators to have taken a training class. Refer to the requirements of the specific state you are in. The following states require training: NH, VT, CT, PA, NJ, DE, and MD at this time (Dec 2008). The USCG Small Boat Safety Training meets the classroom piece of the Cianbro small boat operator certification.

7.6.3 Marine operations training program: All team members must be trained in the hazards of working on or near the water through activity plan reviews, safety meetings and/or training programs. It is recommended that all team members working on and with boats and barges should go through the Marine Operations training program.

- 7.6.4 Push boat operator certification: Operators must be certified the same as for any other piece of equipment (such as crane). In order to operate a Cianbro push boat /dinnie you must be certified by Cianbro.
- 7.6.5 Document small boat operations training on a document training attendance sheet and send it to TrainingAttendance@cianbro.com
- 7.6.6 Allow inexperienced boat operators to practice operating small boats with the supervision of an experienced operator.
- 7.6.7 Riding in small boats:
- Lifejackets are required to be zipped and buckled.
 - Do not stand up unless the boat is designed for it.
 - Keep hands and fingers inside boat to prevent getting pinched between the boat and stationary objects such as a dock or a barge.
- 7.6.8 Coast Guard requirements are based on size of boats:
- A boat over 26' requires licensed operator.
 - A boat over 16' requires additional safety equipment.
- 7.6.9 Pre-use Inspection: Each small boat must have a pre-check of boat, motor, fuel lines and tank, and all safety equipment each morning or at the beginning of the shift. It is recommended that each boat have an assigned team member responsible for this. Use form SD1043 available out on Cianbro.net/Resources/Forms.
- 7.6.10 Re-fueling Procedures Training:
- Secure boats to dock or other structures to prevent movement while re-fueling.
 - Turning off anything that may cause a spark.
 - Removing team members from boats before re-fueling.
 - Know locations of fire extinguishers.
 - Know manufacturer's recommendations for filling portable containers.
 - Use only marine approved plastic and metal containers. Refuel them on the dock or land rather than in the boat.
 - If equipped, operate onboard ventilation system before starting your boat.
 - Clean up any spills. Follow spill clean-up procedures
 - After refueling, perform a "Sniff" test for fuel vapors before allowing team members back on the boat.

7.7 Barges

7.7.1 Line Handling

- Deck lines can be lethal and need to be treated with respect. When moving barges, care must be taken to slow down significantly before holding a line onto another barge. We use anything from 1½" to 3" lines of various materials. Nylon stretches drastically but is very strong. Polypropylene (poly) is a good cheap floating line often used on barges. Combination poly and Dacron is a good mix that still floats and wears better than poly alone. Newer "Spectra" made of Kevlar is the best available but very expensive and still is prone to chafe and wear. Kevlar has zero stretch so if it breaks it just falls and no one can get hurt from being in the line of fire. Most tugs use this line now because of this safety characteristic.
- Splicing an eye in your line is recommended as it is stronger than a bowline knot. The eye should be about 3' long. The opposite end of your line should not have an eye in case it needs to be let go and run off the barge in a hurry. If the line is for long term use, then back splice this opposite end. Always tape ends of lines with duct tape to keep them neat and free of loose strands.
- When a line breaks (other than Kevlar), it creates a significant hazard to personnel. Always be aware of the line of fire. If a line parts, it will shoot directly back in line with the bit that it was secured to. Stay out of this zone in order to significantly reduce the risk of getting struck by a line. The bigger the line that parts (breaks),

the more damage it will do. Inspect your lines each day and remove damaged ones from service.

- Keep lines coiled up (clockwise) and out of work areas. These lines are a very important part of your operation and need to be maintained in good conditions. Also keep lines on boats picked up and away from openings in the boat rails. Tie these to a high rail if going to sea.
- Keep a long-handled axe (or axes) in a protective sleeve in an accessible location such as with each life ring on a barge, in case a line needs to be cut in an emergency. Make sure no one is in the line of fire if you have to cut a line under tension!

7.7.2 Mooring

- When securing a barge to an anchor, make sure to wire the shackle pin securely (#9-wire works well) to keep the pin from backing out and releasing the barge. Lines to a dock need to be left slack enough to allow for the rise and fall of the tide. Four lines should be used, two crossed along the side will be fore and aft spring lines and a long line across the bow and across the stern should hold those ends in to the pier. If bad weather is expected, put all lines out as they won't help coiled up on deck. Some newer barges have heavy rubber built into the side rails.

7.7.3 Fendering

- Fendering is recommended between barges to keep them apart, minimizing damage from wave action, boat wakes, and when moving through the water. Tires are common fenders, inexpensive and easy to install. Pine logs, called "camels," are also common.
- Keep the fenders high on the side of the barge and up out of the water. This keeps them from going under the barge and reduces drag in the water. In order to minimize the gap between barges, keep the fenders as thin as possible. The four corners of your barge should be well fendered.
- In addition, sharp corners should be rounded over and covered with wood or rubber (especially on our push boats/dinnies). These sharp corners can slice down the side of a barge.

7.7.4 Handling Spuds (See also 9 1 Appendix A)

- One way of holding a barge or moving a barge into position is with the use of spuds. These spuds are fabricated using different types of materials such as pipe or box tubing. The length and diameter of the spuds may vary also. The length of the spud is determined by the depth of the water and the overburden. The diameters of the spuds vary from 12" which is considered a small size, to 18"-24" which is considered to be typical size, to 48" which is one of the larger sizes. Spuds are located in permanent pockets or attachable vertical guide sleeves called spud wells.
- Used in multiples, they serve to position and securely anchor, floating assemblies against lateral forces resulting from current, wind, and on-deck machinery. Spuds are raised by either the on-deck crane or by a mechanical or hydraulic winch and a two-part system. Holding spuds depend on gravity drop and bottom penetration for horizontal holding. The type of bottom surface can also influence the effectiveness of the spud. If the bottom surface is soft the spud will penetrate easily, but if the bottom surface is hard the spud may not penetrate well. Spuds can also be used for turning or walking barges in tight areas. When using spuds with barges, careful attention must be used. Keep in mind the barge floats up and down on the spuds, because the spud pockets are a larger diameter than the spuds themselves. Wind and current can cause the spuds to jam in the spud pockets. This can either bend the spuds or damage the attachable spud wells by ripping them away from the barge. Spuds that are jammed also will not allow the barge to float up and down and could cause the barge to either sink or float away.
- Checking spuds for plumb and looking to see what side of the spud pocket the spud is hitting will determine which way the barge will have to move to free the spud. The formation of ice around spud pockets during cold weather could also jam up spuds and not allow proper barge movement. Spuds must also have the proper rigging on them for lifting. The use of homemade chokers made with cable and wire

rope clips is no longer acceptable for lifting overhead. Spuds must be raised enough to clear obstructions when moving and should be marked with paint when raised, so that the spud point is flush with the bottom of the barge. Holes for pins should be in the spuds at many heights with pipes welded inside the spud at these holes. Spud pins should be made of cold-rolled steel and be of a large enough diameter to carry the weight of the spud full of water.

7.7.5 Using spud pins to free up stuck spuds or for laying down spuds:

- When a barge is left overnight or for a prolonged period of time, the spuds will settle deep in the bottom, if the bottom conditions are soft and muddy. This can be prevented by placing cold rolled pins in holes in the walls of the spud at an elevation above the deck, which would pull the spud out of the mud. This pin will stop at the top of the spud pocket as the spud settles, but will not allow the spud to go any further. Care must be taken to properly measure and determine which pin hole to use when doing this, as using a hole that is too low will pull the spud out of the mud at high tide, allowing the barge a chance to get away.
- This pin must be watched daily to make sure it stays in the hole properly and does not bend.
- A spud may be lifted from its pocket and laid down horizontal to allow passage under bridges, etc. If a pin is inserted in the spud for this purpose, make sure the pin is well above half way up the spud or the spud will tip over with dangerous results. This pin needs to be wired in place if laying the spud down.
- Only heavy wall pipe should be used to build spuds, due to the forces placed upon them. Engineers should be involved with spud designs.

Note: When in doubt concerning bad weather, take the time to move the barge to a safe area rather than relying solely on the spuds to hold the barge in place.

7.8 Deck Winches, Guarding of Running Lines

7.8.1 Deck winches and associated deck lines are one of the most hazardous situations on barges. The load on these components can be very high when pulling spuds. The following items will help reduce the risk:

- The capacity of the wire rope, sheaves, and any other components should be higher than the maximum line pull of the winch.
- Ensure the winch is adequately secured to the deck. Have it designed or checked by an engineer. If a turning block is used, make sure it is adequately secured to the deck also.
- Position winches as close to the spuds as possible to reduce amount of cable on the deck.
- Provide a guard to protect the winch operator from flying debris if something breaks.
- Guard the cable lying on deck. One way is to weld pieces of chain over the top of the cables every 20 feet or so with enough slack so that the cable can lift as high as it needs to when under tension. The chain will catch the cable if it breaks.
- Stainless cable stands up to the weather better and reduces failures due to corrosion.
- The best thing one can do is always stay out of the line of fire when the winch is in use!

7.9 Navigational Lighting

7.9.1 Lights need to be placed on barges when on the edge of a channel and on a mooring.

7.9.2 Place a constant burn white light at each outboard corner, day and night with visibility of at least one mile. (Do not use blinking yellow lights).

7.9.3 The following light is recommended: White LED 6-volt magnetic base anchor lights with a photocell that shuts them off during the day.

7.10 Night Work

- 7.10.1 Work area lighting: Make sure the barge is well lit at night. It is important that the lighting be aimed downward to avoid shining in the eyes of boat traffic.
- 7.10.2 Rescue considerations: It is much more difficult to see a person in the water at night, especially if the person is unconscious. Extra precautions need to be taken.
- Call the Coast Guard.
 - Use water activated lights attached to lifejackets.
 - Have a spot light available on the barge.
 - Take into account cold temperatures and current as well.

7.11 United States Coast Guard Requirements

OSHA has primary jurisdiction over marine construction work. However the Coast Guard regulations do apply for inspected and un-inspected vessels.

7.11.1 Personal Flotation Devices (PFD) and other lifesaving equipment [46 CFR 25.25].

- An approved and readily available PFD is required to be on board the vessel for each individual on board. An exposure suit is considered to be an acceptable substitute for a PFD. All lifesaving equipment designed to be worn is required to be readily available and in serviceable condition.
- Each vessel 26 feet or longer must have at least one approved life ring buoy which is immediately available. All lifesaving equipment designed to be thrown into the water is required to be immediately available and in serviceable condition.
- An approved commercial hybrid PFD is acceptable if worn when the vessel is underway and the intended wearer is not within an enclosed space; labeled for use on uninspected commercial vessels; and used as marked and in accordance with the owner's manual.
- An approved light is required for all PFDs and exposure suits (Cianbro – if worn at night). Also, all PFDs must have approved retro-reflective material installed.

7.11.2 Fire Extinguishing Equipment [46 CFR 25.30]

- Hand-portable fire extinguishers and semi-portable fire extinguishing systems must be of the "B" type (i.e.; suitable for extinguishing fires involving flammable liquids, greases, etc.). *Note: Cianbro will accept type ABC extinguishers*
- Hand-portable fire extinguishers and semi-portable fire extinguishing systems must have a plate listing the name of the item, rated capacity (gallons, quarts or pounds), name and address of person/firm for whom approved, and manufacturer's identifying mark.
- Portable fire extinguishers must be inspected monthly (Cianbro requirement).
- Minimum number of B-II hand portable fire extinguishers required to be on board motor vessels: one if less than 50 tons, two if 50-100 tons, three if 100-500 tons, six if 500-1000 tons, and eight if over 1000 tons.
- Fixed fire extinguishing systems must be an approved carbon dioxide type and must meet the U.S. Coast Guard requirements.
- Backfire Flame Control [46 CFR 25.35]. Every gasoline engine installed after April 25, 1940, except outboard motors, must be equipped with an acceptable means of backfire flame control.
 - Ventilation of Tanks and Engine Spaces [46 CFR 25.40]. Fuel tanks and engine spaces, using fuel with a flashpoint of 110 degrees Fahrenheit or less, must be provided with adequate ventilation to remove explosive or flammable gases from the fuel tank compartment or bilges.

7.12 Marine Surveyors

- 7.12.1 Marine surveyors are usually hired by insurance companies to inspect barges before being rented, before going to sea, after cranes are loaded and when returning barges off rental. Their inspection usually involves physically entering the barge compartments with a flashlight, measuring dents, recording any damage and leaks (Follow confined

space entry requirements). It is recommended to open the hatches 24 hours ahead of time to help ensure a safe atmosphere.

7.13 Dealing with Weather (Monitoring forecast, lightning, storms)

7.13.1 Monitoring of weather: When working on the water, the weather should be monitored throughout the day. Assign this responsibility to specific person. Use the internet and/or a marine radio to track the weather.

7.13.2 Emergency plans: Identify weather related emergency plans including for lightning in area.

7.14 Barge Stability (Involvement of Cianbro design group, ballasting barges including not using water for crane barges)

7.14.1 Owner's permission: We need the owner's permission if it is a rental barge.

7.14.2 Ballasting: Ballast using something other than water whenever possible.

7.14.3 Water: Use water if necessary and it should be fresh water.

7.14.4 Condition of bulkheads: Make sure bulkheads inside the barge will hold water (no holes and not rusted through) before ballasting with water, as it could all run to one corner with disastrous results.

7.14.5 Filling: Fill the compartment completely – this is critical if there is a crane on the barge so the water does not slosh and cause instability.

7.14.6 Reducing freeboard: If using ballast to reduce freeboard to <6', fill the four corner compartments or use other than water.

7.14.7 Engineering design: Involve the Cianbro temporary design and equipment groups.

7.15 Safety

7.15.1 Location of life rings: It is recommended that life rings be on crane rails and/or mounted on conex boxes. Make sure they are easily visible and accessible. We must have 90' of line stored so that it does not get tangled. Life rings must be placed no greater than 200' apart.

7.15.2 Man Overboard:

- A rescue plan and drill are required for all Cianbro sites when working around water. Refer to the 041 Water Rescue Safety Policy and Procedure for guidance.
- A safety boat must be immediately available (so that the team member will be rescued within four minutes from the time the person enters the water) for rescue when team members are working over or near water. If a boat is being used to work out of then it cannot be the safety boat.
- One person should always be assigned to watch the person in the water at all times in order to guide the rescuers to the person.
- In situations with cold water or significant currents, consider installing lines around the barge hanging down into the water with large eye spliced loops in the end. These ropes allow a place to get hold of and also allow you to either stand in the loop to get up out of the water or to get your arm through the loop to hold on as the cold water will rob you of the ability to hold on with your hands.

7.15.3 Lifejacket Requirements:

- Lifejackets are required on all boats and barges and anytime team members are working over or near water where the risk of drowning exists. If no risk of drowning exists on a barge (i.e. no risk of barge capsizing and the team member is inside a

crane cab or structure secured to barge deck) then life jacket not required to be worn. Lifejackets will be worn at all times on the barge deck or in an aerial lift on a barge.

- Lifejackets must be in good condition and kept zipped and buckled. Inspect them each day before use. Remove defective lifejackets from service.
- If 100% fall protection is maintained with absolutely no exceptions, then lifejackets are not required unless on boats and barges or in an aerial lift on a barge.

7.15.4 Fall Protection

(reference 011 Fall Protection Safety Policy and Procedure)

- Fall protection is required at 6' or more above the water.
- If both a harness and a lifejacket are required, it is best to wear the harness over the lifejacket. This allows the lanyards and harness to function as designed and also allows easier removal of the harness after a fall into the water. If this is not possible, make sure your lanyards come out the top of the lifejacket, not the bottom so you do not end up in a jackknifed position if you fall.

7.15.5 Stokes Basket: The emergency plan for site will identify if a Stokes basket is required. If a Stokes basket is to be used, it should have the floats attached to the cage to make it buoyant.

7.15.6 Confined Spaces (compartment inspection on barges):

- All barge compartments are considered to be confined spaces and are likely to have a hazardous atmosphere. Follow the Confined Space Safety Policy and Procedure. It is recommended that barge hatches be opened 24 hrs prior to entry. Don't forget to address the fall hazard caused by the open hatches, use physical barriers whenever possible.
- Compartments in ships can also be confined spaces and require a combination of a Certified Marine Chemist and Shipyard Competent Person involvement prior to entry.

7.15.7 Sub Marine Utilities

- Activities that may affect sub marine utilities are dropping spuds, driving pile, dredging, and any activity that disrupts the sub marine terrain.
- Once identified, all sub marine utilities adjacent to the work area must be marked so that adequate distances can be maintained from them. This will usually be done with buoys. Make sure to consider tide changes when marking them and the potential for the utilities to move (from storms, hooked by fishermen, etc.).
- The activity plan process must identify all activities that may involve interferences of utilities. The utilities must be moved and secured and/or verified following our Zero Energy State Policy and Procedure when our activities could interfere with the utility. The project is responsible and required to contact each utility company directly for verification and proper management of utilities potentially affected.
- The Public Utilities Commission and other permitting authorities such as the Army Corps of Engineer, DOT, DEP, etc. are not responsible to identify sub marine utilities but may be of assistance. In addition, the project team should use the One Call System (Dig Safe, Miss Utility, etc.) for assistance, see the Safety Policy Procedure 004 Excavation Safety, 7.6 Call Before You Dig Law, for your local One Call Agency contact. The project team is responsible to ensure all potentially affected utilities (electric, gas, etc.) are identified and managed appropriately.

7.16 Housekeeping on Barges

7.16.1 Because of the limited space available on barges and the additional risk of being on the water, it is critical to maintain the good housekeeping on all barges. This includes making sure you have access to all areas of the barge. Keep up with the housekeeping as you go. Maintain a three foot clear area around the edge of the barge to allow easy movement.

See 9.2 Appendix B Barge Set-up.

7.17 Notification to Marine Traffic

- 7.17.1 Notice to Mariners: Put a notice in "Notice to Mariners" well ahead of beginning work in an area through the Coast Guard. Federal regulations require notification to mariners in writing of any activity that may/will disrupt navigable waters. Closures to navigable waters extended in excess of 12 hours require a 30-day prior notification to the Coast Guard for approval. Closures to navigable channels in excess of 12 hours require 60-day notification and approval from the Coast Guard.
- 7.17.2 Barge Signage: We need to consider signage in water traffic areas. Permission is needed to post signs for waves and wake issues. Waves can seriously affect the safety of team members in aerial lifts and other equipment.
- 7.17.3 Traffic Control: We may need to get an agency to help in ticketing traffic if necessary.
- 7.17.4 Speed Control: If it is critical, we can put someone out in a boat to help control the speed of boaters in the area.

7.18 OSHA CFR 1915 Shipyard Industry

- 7.18.1 What Applies: Any "work" on a marine vessel all Cianbro workers, subcontractors and others in our control shall comply with CFR 1915 and all related regulatory agencies including the NFPA and the USCG. Shipbuilding and ship repair activities are some of the most hazardous shipyard operations. There are multiple types of construction which may include modular construction, traditional construction (from keel up), and fiberglass/composite material mold construction. Shipbuilding and repair includes constructing, assembling, installing, cleaning, painting, outfitting, and testing. Hazards include exposure to toxic substances, hazardous atmospheres, electrocution, falls, fires, and explosions. These hazards can be eliminated or minimized through use of an effective safety and health program.
- 7.18.2 Some Differences from CFR 1926 and CFR 1910:
- 1915 Subpart D: Welding, Cutting and Heating. **Compressed gas** - no cylinders in confined/enclosed spaces, ALL hoses (flammable and inert gasses) must be pulled out of confined and enclosed spaces at the end of every shift or if that space is unoccupied for a period of time. Refer to 9.3 Appendix C OSHA CFR 1915 Compressed Gas Matrix.
 - 1915 Subpart E: Scaffolds, Ladders and Other Working Surfaces. **Fall Protection** - 5ft max working height without protection.
 - 1915 Subpart B: Confined and Enclosed Spaces and Other Dangerous Atmospheres. **Hot Work** – You shall have certification by Certified Marine Chemist to perform Hot Work on or adjacent to tanks, holds, piping systems or mechanical systems that contain(ed) flammable or hazardous materials. The Certified Marine Chemist will authorize the work with a conditional Certified Marine Chemist Permit only.
 - 1915 Subpart B: Confined and Enclosed Spaces and Other Dangerous Atmospheres. **Confined Space** - Ship Yard Competent Persons (SCP) must inspect all confined spaces before anybody accesses. SCP must inspect air quality and perform a physical hazard assessment and label the space specifically "Safe for Worker's," "Not Safe for Worker's," "Safe for Hot Work," and "Not Safe for Hot Work". Refer to SD1045 OSHA CFR 1915 Log of Inspections available on Cianbro.net/Resources/Forms and 9.4 Appendix D OSHA CFR 1915 Shipyard Competent Person.
 - 1915 Subpart D: Welding, Cutting and Heating. **Ventilation** – Ventilation shall be provided whenever welding, cutting or heating is performed in a confined space.
 - 1915 Subpart P: Fire Protection. **Fire Safety Plan** – Each project is responsible for and must develop and implement a written fire safety plan that covers all the actions that employers and team members must take to ensure team member safety in the event of a fire. Also refer to 9.5 Appendix E OSHA CFR 1915 Shipyard Subpart D - Fire Watch Responsibilities. (Renumbering needed)

- 1915 Subpart L: Electrical Machinery & Subpart H: Tools and Related Equipment. **Electrical Supply** – Use temporary shore power whenever applicable. Minimize the use of the vessel's closed circuit delta system for our electric supply. Most vessels use a closed circuit delta system where the use of a GFCI is not applicable.
- If you find you are limited with temporary shore power, investigate other options. Limit a "fab area" on the deck of the ship that is fed by our GFCI shore power circuits.
- Where it is required to run electric power inside the vessel use power fed by GFCI shore power circuits. Run the electric power supply through vent trunks, hatches, and other penetrations.
- Use the ships air system for tooling. Use MORE pneumatic tools.
- Use more battery operated tools such as drills, saber saws, work lights, and circular saws

The OSHA.ORG (1915) site is very good and very interactive.

7.19 OSHA Ergonomic Guidelines for Shipyards

- 7.19.1 OSHA has established ergonomic guidelines. Only one currently relates to our industry, "Shipyards". These voluntary guidelines will provide information to help employers identify ergonomic hazards in their workplaces and implement feasible measures to control those hazards.
- 7.19.2 These guidelines provide recommendations for shipyards to help reduce the number and severity of work-related musculoskeletal disorders, increase awareness or ergonomic risk factors, eliminate unsafe work practices, alleviate muscle fatigue, and increase productivity.
- 7.19.3 The ergonomics-related risk factors that shipyard team members are most often exposed to include:
- Force - the amount of physical effort required to perform a task (such as heavy lifting, pushing, pulling) or to maintain control of the equipment or tools.
 - Repetition - performing the same motion or series of motions frequently for an extended period of time.
 - Awkward and prolonged static postures - assuming positions that place stress on the body, such as repeated or prolonged reaching above the shoulder height, bending forward or to the side, twisting, kneeling, or squatting.
 - Contact stress - pressing the body or part of the body (such as the hand) against hard or sharp edges, or using the hand as a hammer.
 - Vibration - using vibrating tools such as sanders, chippers, drills, grinders, or reciprocating saws may result in fatigue, pain, numbness, increased sensitivity to cold, and decreased sensitivity to touch in fingers, hands, and arms. Exposure to whole body vibration may damage the joints of the skeletal system.
 - Cold temperatures combined with the risk factors above may increase the risk of musculoskeletal disorders.

For a wide variety of shipyard ergonomic solutions please refer OSHA's Guidelines for Shipyards; <http://www.osha.gov/dsg/guidance/shipyard-guidelines.html>

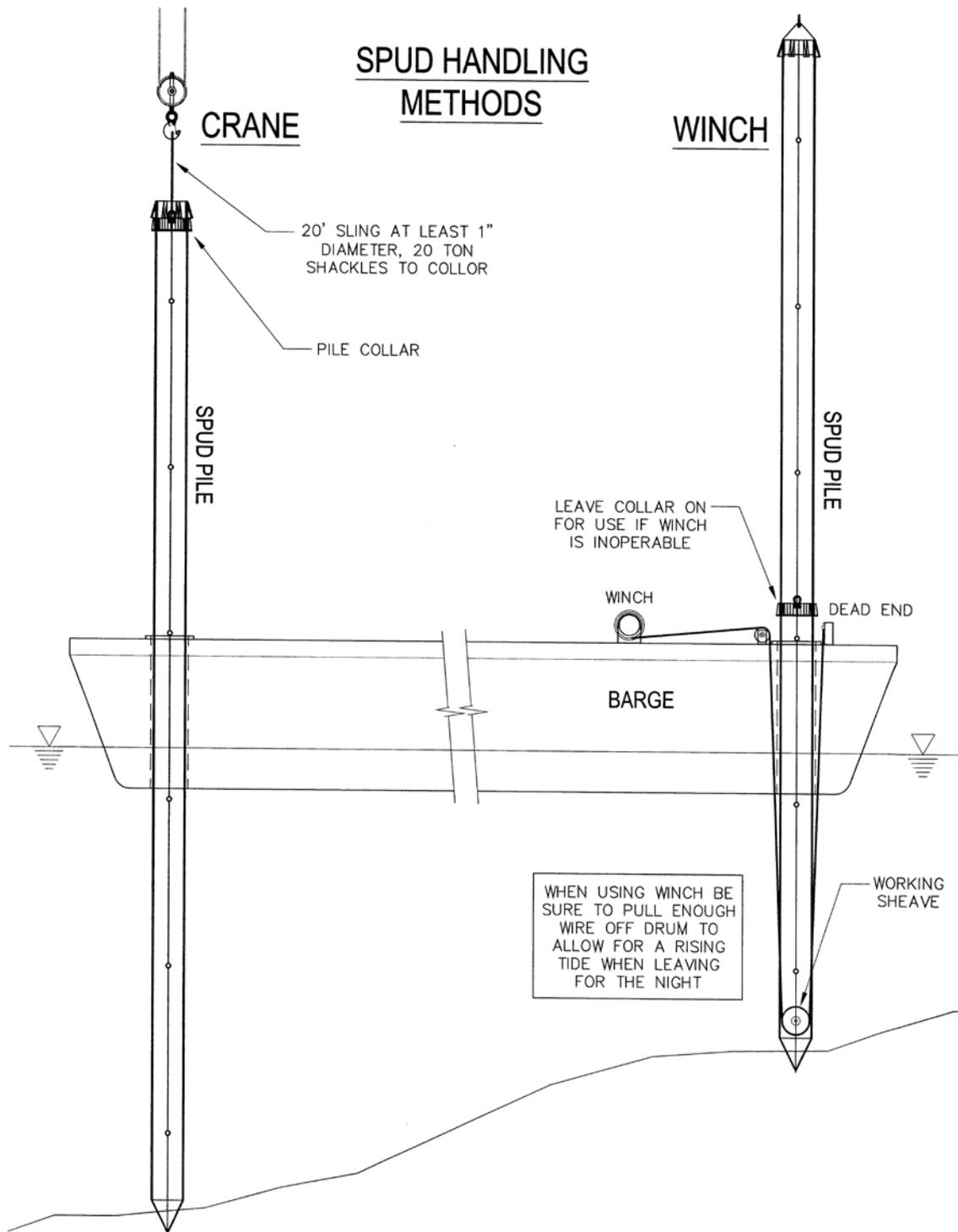
8 Budget / Approval Process

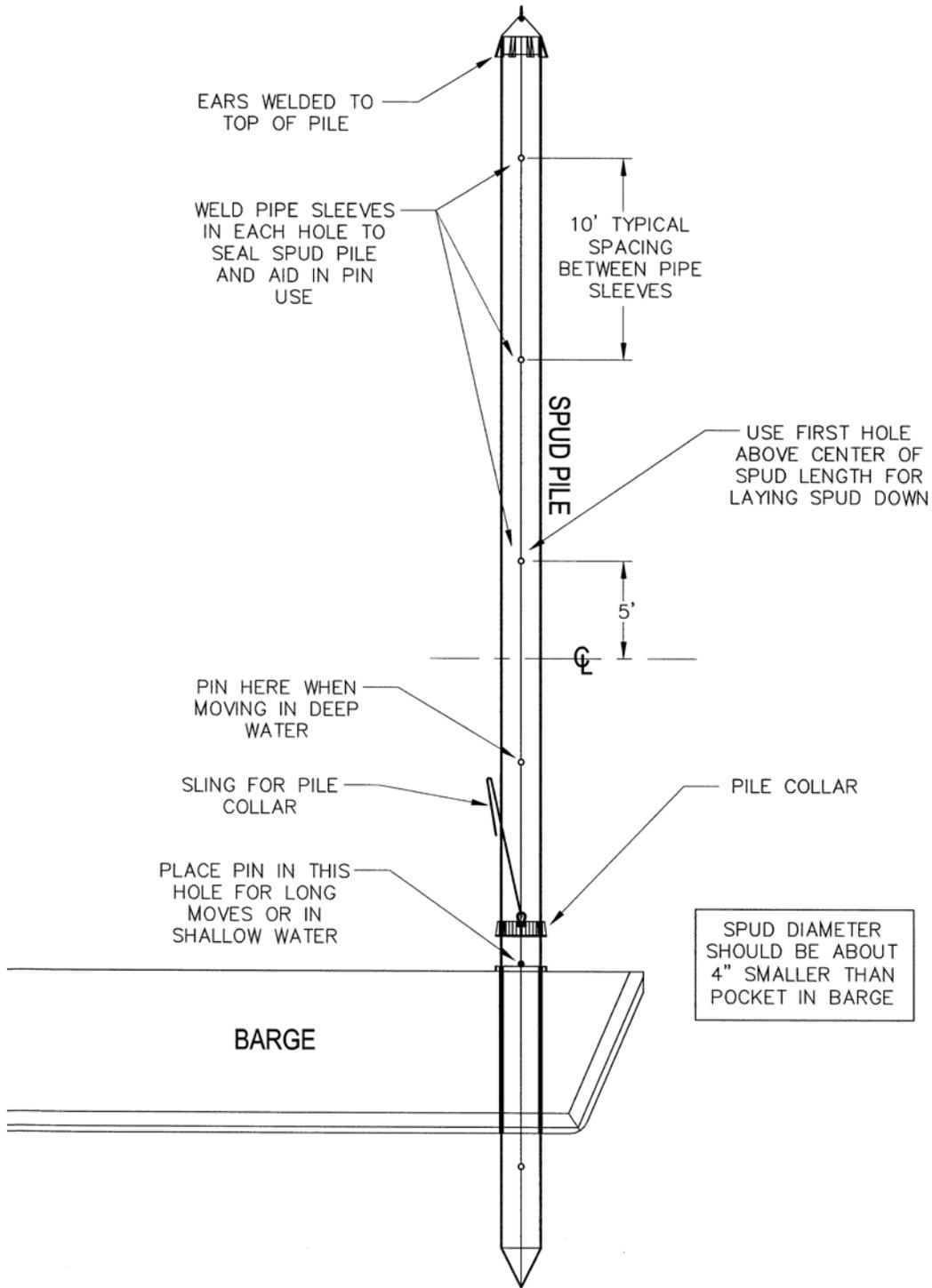
- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments.
- 9.2 Documents available on Cianbro.net/Resources/Forms.

Life Saving Skiff Pre-Inspection Checklist	SD1043
Shugart Barge Pusher Pre-Inspection Checklist	SD1051
Work Boat Operations Skill Certifications Qualification Checklist	SD1044
OSHA CFR 1915 Log of Inspection	SD1045
Bulk Fuel Tank Monthly Inspection	SD1018







Effective barge set-up requires planning in the early stages of project.

- Set up the barge in a manner that works for the sequence of steps of the work.
Consider:
 - Crane size and position
 - Fendering
 - Material storage
 - Work space on barge
 - Access
 - Crew trailer
 - Utilities (Electric, Hydraulic, Air)
 - Position in water way
 - General housekeeping
 - Rigging rack

Keep the deck CLEAR!!!

OSHA CFR 1915 Compressed Gas Matrix

Cutting, Welding, Heating Gasses

	Turn Off Oxygen	Turn Off Fuel Gas	Turn Off Shielding Gas	Disconnect Fuel Gas Hose from Manifold or Regulator. Remove Regulator from Cylinder and Store Properly.	Disconnect Oxygen Hose from Manifold or Regulator. Remove Regulator from Cylinder and Store Properly.	Disconnect Shielding Gas from Manifold or Regulator. Remove Regulator from Cylinder and Store Properly.	Remove Oxygen Hose From Space	Remove Fuel Gas Hose From Space	Remove Shielding Gas Hose From Space
Coffee Break	X	X	X						
Lunch	X	X	X						
End of Shift	X	X	X	X	X	X	X	X	X
Unattended for More Than One Shift	X	X	X	X	X	X	X	X	X

Fuel Gas = Propane, Acetylene, Oxygen, MAPP Gas

Shielding Gas = Argon, C25

Each Team Member using fuel gas or shielding gas is responsible for complying with these rules.

Failure to comply means 8 hours off without pay the first time and 24 hours off without pay the second time and termination if it happens a third time.

OSHA 1915 Shipyard Competent Persons

As required under the OSHA regulations that apply to the Marine Industry contained in 29 CFR 1915. The employer is required to post the names, training dates and a brief outline of the information covered in the “competent person” training.

The following is a brief outline of the subject matter that was covered in the competent person training. The subparts of OSHA 29 CFR 1915 address the Designated Competent Person requirements and responsibilities for **Recognizing, Evaluating and Controlling Confined Spaces**.

SUBPART A: Explains the skills, logging requirements and job performance requirements of the Designated Competent Person.

SUBPART B: Identifies hazardous locations minimum conditions required for entry and work in spaces. It explains how to maintain safe conditions and what to do if conditions change.

SUBPART C: Identifies the requirements for maintaining safe conditions during painting and the use of hazardous solvents. It explains the required conditions during work on coated surfaces.

SUBPART D: Explains the duties of the Designated Competent Person during welding, cutting, and heating. It explains where and when the Designated Competent Person must test for flammable vapors during hot work. It outlines the use of ventilation and fire watches during hot work.

SUBPART H: Explains where and when the Designated Competent Person must test for Carbon Monoxide and Carbon Dioxide. The use of tools and other equipment during the repair and alteration of marine vessels is outlined. In section 1915.152 respiratory protection requirements are explained.

The NFPA (National Fire Protection Assoc.) standard # 306 “Control of the Gas hazard on Vessels” was part of the criteria for the Designated Competent Person training.

OSHA CFR 1915 Subpart D: Welding, Cutting and Heating Ventilation



Marine Definitions

ABS: American Bureau of Shipping: A U.S.-based private classification, or standards setting society for merchant ships and other marine systems.

Beam: The width of a ship. Also called breadth.

Bow Line: A docking line leading from the bow.

Bow Spring Line: A bow pivot line used in docking and undocking, or to prevent the boat from moving forward or astern while made fast to a pier.

Bulkhead: A name given to any vertical partition which separates different compartments or spaces from one another.

Coaming: A vertical piece around the edge of a cockpit, hatch, etc. to prevent water on deck from running below.

Draft: The portion of the vessel that extends from the waterline down into the water.

Freeboard: The portion of the vessel that extends from the waterline up out of the water.

Hold: A general name for the large compartments below the main deck designated for stowage of general cargo.

Inboard: More toward the center of a vessel; inside; a motor fitted inside a boat.

Intracoastal Waterway: ICW: bays, rivers, and canals along the coasts (such as the Atlantic and Gulf of Mexico coasts), connected so that vessels may travel without going into the sea.

Keel: The lowest longitudinal timber of a vessel, on which framework of the whole is built up; combination of iron plates serving same purpose in iron vessel.

Knot: A measure of speed equal to one nautical mile (6076 feet) per hour. To convert knots to statute mph, multiply by 1.14.

Leeward: The direction away from the wind; Opposite of windward.

Main Deck: The main continuous deck of a ship running from fore to aft; the principle deck; the deck from which the freeboard is determined.

Outboard: Toward or beyond the boat's sides. A detachable engine mounted on a boat's stern.

Solas: Safety of Life at Sea Convention.

Spring Line: A pivot line used in docking, undocking, or to prevent the boat from moving forward or astern while made fast to a dock.

Stern Line: A docking line leading from the stern.

Tonnage: Deadweight, gross, net, displacement.

Windward: Toward the direction from which the wind is coming.

Policy Number 044**Authorized By:** Michael W. Bennett**Title:** Subcontractors Best Practices at Job Sites**Effective Date:** 06/11/07Page 1 of 7

1 Status

1.1 Update of existing policy, effective 09/04/14.

2 Purpose

2.1 To provide guidance and best practices for managing subcontractors at Cianbro locations to ensure subcontractors are working safely and meeting all safety requirements.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 None

5 Policy

5.1 Cianbro managers are responsible to ensure that any tiered subcontractor working on their site are meeting all state, federal, and Cianbro safety requirements to ensure all workers are provided a safe working environment.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 Corporate Safety is responsible for maintaining this document.

6.3 All Cianbro managers and supervisors on site are responsible to suspend any activity being conducted by a subcontractor, which could endanger the safety and health of any person until that unsafe or hazardous condition is corrected by that subcontractor.

7 Best Practices for Subcontractors at Job Sites Index

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Cianbro is responsible for the safety of our subcontractors. In order to ensure that they meet our standards, please follow the recommendations and requirements in this policy.

7.1 Prior to Subcontractor Award

- 7.1.1 Project management teams must work with Corporate Purchasing to ensure that subcontractors meet minimum criteria prior to award. Cianbro's subcontractor safety questionnaire, contained within Purchasing's Subcontractor/Vendor Prequalification Form (PU309), must be completed by each subcontractor. Based on the information received in this prequal, Purchasing will add the subcontractor to the Approved Providers List (APL) and categorize the Sub as green, yellow, or red (see the breakdown of each category below and on the Approval Matrix in Appendix B). These categories will show the Subs that are approved, Subs with areas of concern, and Subs not approved -pending further evaluation from the HSSE Manager. This process will help the project management team in their Subcontractor selection and point out areas of concern that they can address with Subs prior to the start of work. Pre-award meetings should be held with all potential new subcontractors to ensure that they fully understand the scope of work and safety, cost, quality, and schedule requirements. Existing subcontractors who have proven to be qualified based on previous performance must still be re-qualified annually using the same criteria, where applicable. Prior to selecting a Sub – check with Purchasing or refer to the APL to see if there is a performance evaluation on file from a previous Cianbro job. This could help with your decision.

Subcontractor Safety Prequalification Categories

Green – Approved

- EMR is less than 1.0 for the current and previous 3 years
- No Repeat or Willful OSHA citations
- No Fatalities
- Serious OSHA citations – 3 or less
- Recordable Incident Rate (RIR) is less than 4.0 for the current and previous 3 years

Yellow – Approved with the understanding that the project management team will work with the sub to develop a site specific plan surrounding the safety concerns that categorized them as yellow.

- EMR greater than 1 (and less than 2)
- Repeat or Willful OSHA citations have been reviewed and approved by HSSE Manager
- Incidents involving fatalities have been reviewed and approved by HSSE Manager
- Serious OSHA citations – Greater than 3
- RIR greater than 4.0 (and less than 15.0)

Red – Not approved until HSSE Manager reviews and accepts

- EMR greater than 2
- Any Repeat or Willful OSHA citations
- Any Fatalities
- RIR greater than 15.0

Note: The categories above represent the items a subcontractor is scored on from a safety perspective. However, there are additional categories they are scored in that could affect their green, yellow or red status. Such as, the condition of their quality program, whether or not their certificate of insurance (COI) meets Cianbro's limits, financial info, etc. Please review the Approved Providers List (APL) to see the subcontractor's overall rating. Contact Purchasing to obtain access to the APL.

7.2 Prior to Coming Onsite

7.2.1 Hold a pre-construction meeting with the subcontractor manager who will be onsite to set site-specific expectations. Review safety requirements (including subcontractor safety requirements document from subcontract agreement) and any site-specific safety requirements.

7.2.2 Cianbro to provide:

- Copy of subcontractor safety requirements. See Appendix 9.1 A
- Subcontractor's Condensed Safety Policy and Procedure(s)
- Access to or copies of our MSDS

7.2.3 Subcontractor to provide (if applicable):

- A. Certificate of insurance
- B. Signed subcontractor agreement
- C. Electrical safety program
- D. Written respirator plan
- E. MSDS for any product they will bring on site
- F. Lead/Asbestos or other work plans
- G. Erection and dismantling plans for scaffolding
- H. Completed Major Activity Plans (MAP)
- I. Subcontractor's written Health and Safety Program
- J. Proof of licenses, certifications, and qualifications
 - Electrical and other craft licenses
 - Crane and other equipment operators certifications/qualifications
 - Divers' certifications
 - Powered industrial trucks (fork trucks)
 - Other such as flagging, crane signal person, competent riggers, etc.
- K. Medical
 - Respirator use approval
 - Divers' medical certifications
 - Medical surveillance (Lead, HAZWOPER, etc.)
- L. Training Records as applicable to their work
 - Hazcom (Hazard Communication 29 CFR 1926.59, lead, silica, chemicals, etc.)
 - Fall protection
 - HAZWOPER (Hazardous Waste Operating & Emergency Response 29 CFR 1926.65)
 - Asbestos
 - Powder actuated tools
 - Confined space
 - LOTO (Lockout/Tagout)
 - MSHA Part 46 (training requirements)
 - Small boat operations in states where required
- M. Contact Information
 - Name of safety contact to be onsite
 - Emergency contact list

- First Aid/CPR certified people
- Competent person list

7.3 First Day on Site

- 7.3.1 Cianbro will provide a site specific orientation for all subcontractor personnel and will use hard hat stickers or other methods to keep track of who has had the site orientation.
- Ensure that the orientation includes a review of the site emergency action plan.
- 7.3.2 Subcontractor to provide all necessary PPE for their employees: Safety glasses, safety-toe boots, gloves, goggles, harnesses, hard hats, fire retardant clothes if needed, etc.
- 7.3.3 Subcontractors must have an OSHA 300 Log.

7.4 While Working on Site

- 7.4.1 Subcontractors should be included in stretches every morning including reviewing what work will be going on during the shift with the team.
- 7.4.2 Require daily activity plans (using their form or ours).
- 7.4.3 Require signed apparatus supplied by Cianbro form if using our equipment or scaffolding.
- 7.4.4 Inspect their work throughout each shift and document any issues and corrective actions. Stop their work immediately if it is endangering any person or property until the hazardous situation is corrected.
- 7.4.5 Take appropriate action for violations (e.g. 7 days offsite for an accountability violation). Subcontractors are required to meet all Cianbro safety rules.
- 7.4.6 Require weekly documented safety meetings (or include in ours).
- Subcontractors will participate in Cianbro's SHARE Committee Weekly Safety Site Walkthrough when they are onsite.
 - Subcontractors will hold Weekly Tool Box Meetings with submittal to Cianbro unless they are included in the Cianbro weekly safety meeting.
 - Subcontractors will participate in Cianbro's CAPP Program.
- 7.4.7 Require daily work force report for emergency purposes so that we know who is on site.
- 7.4.8 Ask for copies of their equipment inspection forms.
- 7.4.9 Include the subcontractor in daily or weekly progress/planning meetings.
- 7.4.10 Require them to notify Cianbro of any injury or near miss.
- Immediately verbally.
 - Within 24 hrs in writing.
 - Require a written Lesson Learned for each incident including root cause. All serious incidents, recordables, and lost times will require a conference call with the president to review the lesson learned. The job site team and the client representatives will be part of the call.
- 7.4.11 Subcontractors must submit their work hours and injuries data as requested on the Subcontractor Hours and Injuries Reporting form - found at <http://www.cianbro.com/Vendors.aspx>. This form must be included with each invoice the subcontractor submits to Cianbro.

7.4.12 Project Status Review

- During Operation's 20% and 60% project completion review, the Subcontractor Evaluation Forms (PU306) that have been completed thus far should be reviewed and communicated (Pros and Cons). All evaluations should be completed prior to the end of the job and sent to Corporate Purchasing.

7.5 At Completion of Work

7.5.1 Ensure all waste or hazardous materials have been properly disposed of by the subcontractor, including removal of any unused material.

7.5.2 Once a subcontractor completes their scope of work as determined in the contract, the project management team is required to review their performance using the subcontractor evaluation form PU306. Forward the completed evaluations to Corporate Purchasing for inclusion on the Approved Providers List.

8 Budget / Approval Process

8.1 Each site is responsible for the costs associated with managing their subcontractors.

9 Related Documents

9.1 See attachments.

9.2 Documents available on Cianbro.net>Standard Operating Procedures – on the SOP

Subcontractor/Vendor Prequal Statement	PU309
Subcontractor Evaluation Form	PU306

Note: Form PU309 is only available through the Purchasing Department.

SUBCONTRACTOR SAFETY REQUIREMENTS

Providing a safe work environment - injury free - for all personnel is the subcontractor's number one priority and responsibility. The following Safety requirements are mandatory for all personnel on this Project. They are not intended to be all-inclusive and may need to be supplemented to meet specific project conditions, additional Owner requirements or as agreed to in Cianbro pre-award/pre-construction meetings.

The contractor agrees in the performance of this contract to understand, comply with and enforce the following requirements:

1. APPLICABLE SAFETY RULES All applicable Federal, State, Local or other regulatory agency safety rules including but not limited to the Occupational Safety and Health Act of 1970 and amendments and all applicable Environmental, Hazardous Materials and Waste Management Regulations.

2. MINIMUM REQUIREMENTS Cianbro established minimum requirements:

(A) ANSI approved hard hats with bill forward.

(B) ANSI approved Safety Eye Glasses with hard fixed side shields (for routine work activities); Double Eye Protection (goggles or glasses with face shield) is required when using power tools.

(C) Hard toe leather safety footwear with a minimum of 6" ankle foot support. No sneakers or walking shoes will be allowed.

(D) Work gloves are required and must be appropriate for the hazard.

(E) High visibility safety vests.

(F) Unprotected sides or edges of walking/working areas six (6) feet or more above a lower level shall have conventional team member protection from falling by the use of guardrail, safety net or personal fall arrest systems. Cianbro requires use of full body harness with two shock-absorbing lanyards as part of a fall arrest system. Refer to Cianbro's Fall Prevention Safety Policy and Procedure.

(G) New Team member Orientations and Weekly Safety Meetings shall be conducted and documented specific to hazard exposure in each phase of work. A copy of all sign-off sheets with topic outline for these meetings shall be provided to Cianbro weekly.

(H) Observe and comply with the Cianbro Project Safety Plan in effect. Contractors are required to develop their own Project Safety Plan that promotes awareness of specific hazards and solutions among its employees, which may be subject to review and acceptance by the contractor.

(I) Approved lockout-tagout procedures shall be used and coordinated with all affected parties whenever team members could be harmed by an accidental system or equipment start-up.

(J) All electrical tools will be grounded or double insulated. All temporary or permanent electrical work is to be performed by licensed electricians. Each contractor shall have a written electrical program outlining their specific procedure for GFCI or assured grounding.

(K) Only trained, competent or licensed personnel will operate or service equipment. Equipment will be operated in accordance with manufacturer's recommendations.

(L) All incidents and injuries shall be immediately reported to the Cianbro Superintendent and the Contractor Project Supervisor and a written report completed with a copy to Cianbro.

(M) Work areas shall be maintained clean and orderly at all times. Good housekeeping is essential on this Project.

(N) The use, possession or sale of alcohol or regulated drugs is prohibited. Violators will be removed from the Project.

(O) Prior to each demobilization, the required OSHA 300 log shall be provided to the Cianbro Project Superintendent and forwarded to the Corporate Purchasing Department.

(P) A Contractor Supervisor shall be designated as the Safety Supervisor for all Contractor work - prior to the start of contract work. The Contractor Safety Representative will coordinate/communicate regularly (at least weekly) with Cianbro's Safety Representative and review safety at the project.

3. ACTIVITY SUSPENSION Cianbro Site Managers/Supervisors shall have the authority to suspend any activity being conducted, which could endanger the safety and health of any person until that unsafe or hazardous condition is corrected by the Contractor.

4. VIOLATION OF REQUIREMENTS Violation of these requirements may result in termination of the Contract Agreement.

Cianbro
Prequal Approval Matrix
 Rev
 01.01.2014

	GREEN		YELLOW		RED	
Activity	Metric	Responsible Person	Metric	Responsible Person	Metric	Responsible Person
Safety EMR	<1.0	Purchasing Mgr.	>1.0	Purchasing Mgr.	>2.0	HSSE Manager
Safety RIR	<4.0	Purchasing Mgr.	>4.0	Purchasing Mgr.	>15.0	HSSE Manager
Serious violations	3 or less	Purchasing Mgr.	>3	Purchasing Mgr.	None	None
Repeat and willful violations	0	Purchasing Mgr.	Tagged as yellow if approved by Safety	Purchasing Mgr.	Required Review	HSSE Manager
Fatalities	0	Purchasing Mgr.	Tagged as yellow if approved by Safety	Purchasing Mgr.	Required Review	HSSE Manager
COI Met Cianbro Limits	Meets Exhibit B Requirements	Purchasing Mgr.	Exceptions reviewed per project	Purchasing Mgr.		
Substance Abuse Program	Yes	Purchasing Mgr.	No	Purchasing Mgr.		
Quality Program	Yes	Purchasing Mgr.	No	Purchasing Mgr.	Exception basis	QAQC Manager
DNBI	1 or 2	Purchasing Mgr.	3	Purchasing Mgr.	4	Purchasing Mgr.
Bonding Limits	info only	Purchasing Mgr.		Purchasing Mgr.		
Evaluation	info only	Purchasing Mgr.	Exception basis	Purchasing Mgr.	Exception basis	Purchasing Mgr.
Minority Status	info only	Purchasing Mgr.		Purchasing Mgr.		

Policy Number 045**Authorized By:** Michael W. Bennett**Title:** Asbestos Operations**Effective Date:** 03/25/09Page 1 of 10

1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 To ensure that any asbestos abatement for which Cianbro is responsible or which could affect Cianbro team members, is in compliance with OSHA 29 CFR 1926.1101, State and local regulations.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Asbestos: A widely used, mineral-based material that is resistant to heat and corrosive chemicals. Typically, asbestos appears as a whitish, fibrous material that may release fibers that range in texture from coarse to silky; however, airborne fibers that can cause health damage may be too small to see with the naked eye.
- 4.2 Asbestos Containing Material (ACM): Any material containing more than 1% asbestos.
- 4.3 Authorized Person: Any person authorized by the employer and required by work duties to be present in regulated areas.
- 4.4 Class I Asbestos Work: Activities involving the removal of thermal system insulation (TSI) and surfacing ACM.
- 4.5 Class II Asbestos Work: Activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
- 4.6 Class III Asbestos Work: Repair and maintenance operations where ACM including TSI and surfacing ACM may be disturbed. Examples are working on boilers, valves or pipes or replacing light fixtures or ceiling tiles.
- 4.7 Class IV Asbestos Work: Maintenance and custodial activities during which workers contact but do not disturb ACM. Examples include clean-up after Class I, II, and III work, cleaning up construction waste and debris from the installation of new ACM, stripping and buffing resilient flooring and sweeping, dusting or vacuuming asbestos-containing dust from surfaces or carpeting.
- 4.8 Competent Person: A person who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure and who has the authority to take prompt corrective measures to eliminate them. In addition, for Class I and Class II work who has had a training course which meets the criteria of the EPA's Model.

- 4.9 Fiber: A particulate form of asbestos 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.
- 4.10 Friable Asbestos: A term used to describe any asbestos containing material that when dry, can be easily crumbled or pulverized to powder by hand. Some common examples of items that may contain friable asbestos are pipe and vessel insulation, gaskets, wallboard, some plasters, and acoustical ceiling tiles.
- 4.11 Glove bag: A not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which materials and tools may be handled.
- 4.12 Non-Friable Asbestos: A term used to describe any asbestos that is not as likely to become airborne because it contains a binder or hardening agent such as cement, asphalt or vinyl. Although not as hazardous if it is not disturbed to create particulate, it still needs to be removed, handled and disposed of by qualified individuals. Examples are asphalt roofing shingles, vinyl asbestos floor tiles and transite siding made with cement. Non-friable asbestos can be made friable if disturbed.
- 4.13 Regulated Area: An area established by the employer to identify and mark locations where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed, the permissible exposure limits. All Class I, II, and III asbestos work must be conducted in regulated areas.

5 Policy

- 5.1 Cianbro does not self perform asbestos abatement. Any asbestos work managed by Cianbro must meet the minimum requirement contained in this policy.
- 5.2 There are specific limited cases where Cianbro directly supports the asbestos abatement activities of an abatement subcontractor (Heavy equipment operation is one example) and would need to be trained to a higher level. These are all on a case by case basis and must have the approval of the Corporate Safety Officer or designee.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviations from the requirements contained in this policy.
- 6.2 The top Cianbro manager at the job site is responsible for the implementation of this policy.
- 6.3 Corporate Safety is responsible for maintaining this document.

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7.1 Exposure Limits

Although Cianbro does not perform asbestos abatement, we are sometimes asked to manage other contractors who do asbestos work. This policy is intended to be a general overview that provides minimum requirements for asbestos abatement activities. Project sites can utilize this policy

7.1.1 When asbestos is crushed it disperses a dusting of microscopic fibers into the air that can remain for very long periods of time. These fibers can be unknowingly inhaled and permanently lodged in lung and other body tissues, yet symptoms might not appear for 20 years or more. Exposure to asbestos can cause asbestosis (scarring of the lungs resulting in loss of lung function that often progresses to disability and to death); mesothelioma (cancer affecting the membranes lining the lungs and abdomen); lung cancer; and cancers of the esophagus, stomach, colon, and rectum. Unfortunately there is no known safe level of exposure.

7.1.2 Subcontractors engaging in asbestos work must ensure that no worker is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8)-hour time-weighted average (TWA). In addition, no worker may be exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over the “excursion” sampling period of thirty (30) minutes.

7.1.3 Asbestos awareness will be reviewed with all Cianbro team members during the site specific orientation.

7.1.4 If asbestos is identified in the work area, all work that could disturb the asbestos will stop until the asbestos is abated by a qualified asbestos abatement company.

7.2 Precautionary Procedures and Personal Monitoring

7.2.1 Precautionary Procedures

- Regulated areas must be established wherever airborne concentrations of asbestos are in excess of the TWA. The regulated area must be identified from the rest of the workplace and access must be limited to authorized personnel. Each person entering a regulated area must be issued and required to wear a respirator and must be instructed not to eat, drink, smoke, chew gum or tobacco, or apply cosmetics while inside the regulated area.
- Engineering and work practice controls must be implemented, when feasible, to reduce and maintain worker exposure to or below the TWA. When such controls are not sufficient to reduce exposure to or below the TWA, they must still be used to reduce exposure to the lowest achievable level and supplemented with appropriate respiratory protection. Whenever practical, asbestos should be handled, mixed, applied, removed, cut, scored, etc. in a wet state sufficient to prevent emission of airborne fibers. ANSI compliant local exhaust ventilation and dust collection systems may also be utilized to minimize exposure.

7.2.2 Personal Monitoring

- Determinations of worker exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term excursion exposures of each worker.
- Representative 8-hour TWA worker exposures shall be determined on the basis of one or more samples representing full-shift exposures for each shift for each worker in each job classification in each work area.
- Initial monitoring must be done for each worker who is, or may reasonably be expected to be exposed to airborne concentrations at or above the TWA permissible exposure limit and/or 30 minute excursion limit.
- After the initial determinations, samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of the worker. In no case shall sampling be at intervals greater than six months for workers whose exposures may reasonably be foreseen to exceed the TWA permissible exposure limit.

7.3 Methods of Compliance

7.3.1 Due to the fact that exposure to airborne asbestos is sometimes difficult to measure reliably, OSHA standards require certain controls for specific asbestos jobs, regardless of measured exposure levels. OSHA groups together work operations that have similar exposure levels and risk into four classes (I, II, III, and IV). Methods of compliance for each category are as follows:

7.3.2 Class I Jobs Require:

- Supervision by a competent person.
- Critical barriers over all openings to the regulated area, or another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area.
- Isolation of HVAC systems in the regulated area (double layer of 6 mil plastic or equivalent).
- Impermeable drop cloths on surfaces beneath removal activity.
- Covering of all objects within the regulated area with impermeable materials.
- Where employer cannot produce a negative exposure assessment, or where PEL is exceeded, ventilation of the regulated area to move air from the employee's breathing zone toward HEPA-filtered collection device.
- One or more of the following specific control methods shall be used for Class I work:
 - Negative Pressure Enclosure (NPE) Systems, where the configuration of the work area does not make erection feasible.
 - Glove Bag Systems, for removal of PACM and/or ACM from straight runs of piping, elbows, and other connections.
 - Negative Pressure Glove Bag Systems, for removal of ACM or PACM from piping.
 - A small walk-in enclosure accommodating no more than 2 persons, if the project can be completely contained in the enclosure.

7.3.3 Class II Jobs Require:

- Supervision by a competent person.
- Critical barriers over all openings to regulated area, or another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area.
 - For all Class II jobs where there is no negative exposure assessment.
 - For Class II jobs where there may be exposure above the PEL.
 - For Class II jobs where the employer does not remove the ACM in a substantially intact state.
- Impermeable drop cloths on surfaces beneath removal activity.
- Additional specific controls are listed for various types of Class II work.
 - Removal of vinyl and asphalt flooring materials which contain ACM or for which in buildings constructed no later than 1980, the employer has not verified the absence of ACM.
 - Removal of roofing material which contains ACM.

- Removal of cementitious asbestos-containing siding and shingles or transite panels containing ACM.
- Removal of gaskets containing ACM.
- Performing any other Class II removal of asbestos-containing material.
- Installation, removal, or repair of intact bituminous/resinous encapsulated roof flashings and asphaltic pipeline wraps.
- Class I methods may also be used for Class II work, except that glove bags are allowed if they fully enclose the Class II material to be removed.

7.3.4 Class III Jobs Require:

- Workers are to wear a minimum of a half face cartridge respirator equipped with a HEPA (N100) filter. Use a glove bag for removal of TSI.
- Plastic sheeting is to be used as a drop cloth on the floor below any TSI and surfacing material that is to be removed.
- Wet methods of ACM removal are to be used to minimize airborne asbestos.
- The room or area must be isolated from the building ventilation system.
- Enclosures under negative pressure are to be constructed to isolate the ACM removal from other areas of the building.
- Perform the work using local exhaust ventilation, to the extent feasible.

7.3.5 Class IV Jobs Require:

- Use of wet methods for cleanup.
- Use of a HEPA vacuum.
- Respiratory protection.
- Bag or wrap and label the material and place in the designated asbestos container.

7.3.6 Cianbro must ensure subcontractor compliance with these, and all other requirements under the asbestos regulations. In order to effectively do this, the following documentation must be required from the subcontractor and be reviewed by the site management team for compliance;

- Written asbestos abatement plan.
- Medical surveillance records.
- Air sampling results.
- Training records.
- Documented daily inspections made by the competent person.
- Required notifications and permits.
- Asbestos waste shipment manifests.

7.3.7 Inspections of the work areas by site management must also be completed (to the extent allowed under the regulations) to ensure compliance with established work practices.

7.4 Personal Protective Equipment

7.4.1 After engineering and work practice controls are in place to minimize the asbestos hazard, protective clothing must be utilized. At a minimum, this shall include gloves, coveralls or Tyvek suits, head coverings, boots, eye protection and hard hats. These items will be provided at no cost to the worker. Clean protective coveralls or Tyvek suits must be provided weekly, or as necessary to insure that they maintain their effectiveness. However, Tyvek suits must be repaired or replaced immediately if ripped or torn. Respiratory protection will be provided at no cost to the worker and should only be used as a last resort or under the following circumstances;

- When there is no reasonable way to eliminate the airborne contaminant.
- During periods necessary to implement feasible engineering and work practice controls.
- If initial air monitoring results show that the contaminant still exists at levels above the PEL despite engineering and work practice controls.
- During emergency situations.

When necessary, respiratory protection shall be selected in accordance with Table 1 below and used in accordance with 29 CFR 1910.134. PAPR's must be made available

to workers should they request them provided known exposure limits for PAPR use are not exceeded.

Table 1 -- Assigned Protection Factors

Type of respirator ^{1, 2}	Quarter mask	Half mask	Full facepiece	Helmet/ hood	Loose-fitting facepiece
1. Air-Purifying Respirator	5	10	50	N/A	N/A
2. Powered Air-Purifying Respirator (PAPR)	N/A	50	1,000	25/1,000	25
3. Supplied-Air Respirator (SAR) or Airline Respirator					
• Demand mode	N/A	10	50	N/A	N/A
• Continuous flow mode	N/A	50	1,000	25/1,000	25
• Pressure-demand or other positive-pressure mode	N/A	50	1,000	N/A	N/A
4. Self-Contained Breathing Apparatus (SCBA)					
• Demand mode	N/A	10	50	50	N/A
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	N/A	N/A	10,000	10,000	N/A

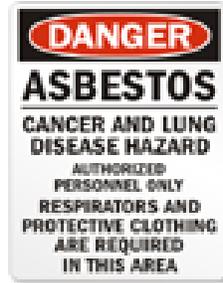
7.5 Hygiene

- 7.5.1 Good hygiene practices are essential to minimize not only the asbestos worker's exposure, but also the possible exposure of other workers not engaged in asbestos abatement that may be working in the general area. Minimum hygiene requirements where worker exposure is above the TWA include;
- Adequate and clean change areas, showers and lunchroom facilities.
 - Workers must wash their hands and face prior to eating, drinking and smoking and shower at the end of their work shift. No smoking is allowed in the work area.
 - Workers must not enter lunchroom facilities with protective clothing or equipment unless they are adequately decontaminated.
 - Contaminated work clothing must be removed in change areas and not taken out of change areas unless by an authorized person for laundering or disposal.
 - Anyone asked to launder contaminated clothing must be informed of the presence of asbestos and that it must be done so as to prevent the release of airborne asbestos fibers in excess of the established PEL.
 - Surfaces must be kept as free as practicable of ACM waste and debris and accompanying dust. HEPA-filtered vacuuming equipment shall be used for vacuuming ACM waste and debris and must be used and emptied in a manner which minimizes the re-entry of ACM into the workplace.

7.6 Signs, Barricades, and Labels

- Warning signs in conjunction with red barricade tape (where applicable) must be provided and displayed at each regulated area. In addition, warning signs must be posted at all approaches to regulated areas so that workers can read the signs and take necessary precautions prior to entry. Where the use of respirators and protective clothing is required, it must be stated as well. Each sign must bear the following information:

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA



Example

- Warning labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers. When a building owner or employer identifies previously installed ACM, labels or signs shall be affixed or posted so that workers will be notified of what materials contain ACM. The employer shall attach such labels in areas where they will clearly be noticed by workers who are likely to be exposed, such as at the entrance to mechanical room/areas. Each label must bear the following information;

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD



Example

- Cianbro team members must be trained to recognize asbestos signage, barricades and labels and to avoid asbestos areas. Any team member who enters an asbestos warning area without authorization or disregards an asbestos sign or label will be subject to disciplinary action.

7.7 Training Requirements

- 7.7.1 Training is required for all workers who perform Class I through IV asbestos work. The training must meet the requirements of the EPA Model Accreditation Plan (MAP) for asbestos abatement worker training. No untrained workers are to disturb any amount of asbestos. The appropriate level of training must be provided prior to initial assignment and annually thereafter. Written materials related to the training program will be readily available to affected team members. The training must be conducted in a manner which workers can understand and include the following topics;
- The health effects associated with asbestos exposure.

- The relationship between smoking and exposure to asbestos producing lung cancer.
- The quantity, location, manner of use, release, and storage of asbestos, and the specific nature of operations which could result in exposure to asbestos.
- The engineering controls and work practices associated with the worker's job assignment.
- The specific procedures implemented to protect workers from exposure to asbestos, such as appropriate work practices, emergency and clean-up procedures, and personal protective equipment to be used.
- The purpose, proper use, and limitations of respirators and protective clothing.
- The purpose and a description of the medical surveillance program.
- The content of the Asbestos standard 29 CFR 1926.1101, including its appendices.
- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.

7.7.2 Training for Class I asbestos workers must consist of either 32 hours in order to be accredited at the worker level, or 40 hours in order to be accredited at the contractor/supervisor level and function as a competent person. An annual 8-hour refresher course is required for both the worker and contractor/supervisor level of training.

7.7.3 Training for Class II workers may be the same as for Class I work (asbestos worker or contractor/supervisor) or may be 8 hours of training, including hands-on training, in the specific type of material to be removed. Removal of the following materials falls under the 8-hour class listing: roofing materials, flooring materials, siding materials, ceiling tiles, and transite panels. An annual refresher is required for all workers.

7.7.4 Training for Class III workers is 16 hours with an annual 4-hour refresher course.

7.7.5 Training for class IV asbestos workers includes an initial two-hour asbestos awareness training with an annual refresher.

7.7.6 All Cianbro team members must receive asbestos awareness training prior to their initial assignment and each time they arrive at a new project site which could potentially contain asbestos. This training will consist of a review of Appendix A along with site specific asbestos hazards and will be conducted and documented as part of the jobsite orientation.

7.8 Medical Surveillance and Recordkeeping

7.8.1 Each asbestos subcontractor must comply with the medical surveillance and recordkeeping requirements set forth in 29 CFR 1926.1101. Subcontractor compliance with these requirements can be verified by reviewing their Asbestos Policy and by requiring documentation which will verify compliance.

7.9 State and Local Requirements

7.9.1 State Environmental Agency regulations also govern asbestos abatement activities in each state. In Maine, for example, DEP Chapter 425 regulations apply and set forth requirements for the following;

- Renovation and demolition inspections by a DEP certified asbestos inspector.
- Completion of an asbestos abatement plan by an asbestos abatement design consultant.
- Disclosures submitted to the owner by the asbestos abatement design consultant.
- Written notification of an asbestos abatement project to the DEP.
- Licensing and permit requirements for business owners and abatement contractors.
- Shipment and disposal of asbestos materials.

Site management teams need to be comfortable that any asbestos abatement activities for which Cianbro is responsible, are conducted within all Federal, State and local requirements.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments



1. Cianbro team members SHALL NOT perform work involving asbestos removal or disposal.
2. Cianbro expects our clients to advise us of the presence of any asbestos in areas we will be performing work.
3. Asbestos awareness training is required for all team members who work in areas that contain, or may contain asbestos. The training will be conducted and documented during jobsite orientations and through our activity planning process.
4. Protective barriers and/or warning signs may need to be installed in work areas to prevent team member exposure. Team members must abide warning signs and labels and avoid areas adjacent to asbestos abatement or storage of abated asbestos.
5. Asbestos Containing Material (ACM) can be friable or non-friable. Friable asbestos is a term used to describe any asbestos containing material that when dry, can be easily crumbled or pulverized to powder by hand. Some common examples of items that may contain friable asbestos are pipe and vessel insulation, gaskets, wallboard, some plasters, and acoustical ceiling tiles. Asbestos is a widely used, mineral-based material that is resistant to heat and corrosive chemicals. Typically, asbestos appears as a whitish, fibrous material that may release fibers that range in texture from coarse to silky; however, airborne fibers that can cause health damage may be too small to see with the naked eye. Non-friable asbestos is not as likely to become airborne because it contains a binder or hardening agent such as cement, asphalt or vinyl. Although not as hazardous, it still needs to be removed, handled and disposed of by qualified individuals. Examples are asphalt roofing shingles, vinyl asbestos floor tiles and transite siding made with cement. The danger with this type of material is that it can pose the same hazard as friable asbestos if disturbed during remodeling, repairs or other construction. Burning ACM also creates friable asbestos. Although use of asbestos in these products was banned by 1978, those already in the marketplace remained on the shelves and were used in construction for many years thereafter. They are still commonly found in buildings and industrial facilities today.
6. When asbestos is crushed it disperses a dusting of microscopic fibers into the air that can remain for very long periods of time. These fibers can be unknowingly inhaled and permanently lodged in lung and other body tissues, yet symptoms might not appear for 20 years or more. Exposure to asbestos can cause asbestosis (scarring of the lungs resulting in loss of lung function that often progresses to disability and to death); mesothelioma (cancer affecting the membranes lining the lungs and abdomen); lung cancer; and cancers of the esophagus, stomach, colon, and rectum. Unfortunately there is no known safe level of exposure, which is why asbestos remains a concern today.
7. If loose asbestos is encountered accidentally or due to poor work practices of an adjacent contractor (asbestos abatement or otherwise), team members are required to leave the area immediately and notify you're their supervisor.

Policy Number: 046**Authorized By:** Michael W. Bennett**Title:** Electrical Transmission and Distribution**Effective Date:** 12/23/08Page 1 of 22

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 Provide the minimum policy and procedural requirements for working in and around Electrical Transmission and Distribution environments.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Activity Plan: A document that encompasses a description of the work to be performed and the methods used to accomplish the work. This plan must be written and presented by a Qualified Person, signed and acknowledged by all team members on the site. Any changes or deviations from this plan would warrant a subsequent plan and discussion as the work and methodology changes.
- 4.2 Authorized: One who has the authority to perform specific duties under certain conditions or who is carrying out orders from responsible authority.
- 4.3 De-energized: Free from any electrical connection to a source of potential difference and from electric charge; not having a potential different from that of the earth. Note: The term is used only with reference to current-carrying parts, which are sometimes energized (alive).
- 4.4 Enclosed space: A working space, such as a manhole, vault, tunnel, or shaft, that has a limited means of egress or entry, that is designed for periodic team member entry under normal operating conditions, and that under normal conditions does not contain a hazardous atmosphere, but that may contain a hazardous atmosphere under abnormal conditions.

Note: Spaces that are enclosed but not designed for team member entry under normal operating conditions are not considered to be enclosed spaces for the purposes of this definition. Similarly, spaces that are enclosed and that are expected to contain a hazardous atmosphere are not considered to be enclosed spaces for the purposes of this definition. Such spaces meet the definition of permit required confined spaces in 1910.146 and entry into them must be performed in accordance with that standard.

- 4.5 Energized (alive, live): Electrically connected to a source of potential difference, or electrically charged so as to have a potential significantly different from that of earth in the vicinity.

- 4.6 Energy Isolating Device: A physical device that prevents the transmission or release of energy, including, but not limited to, the following: a manually operated electric circuit breaker, a disconnect switch, a manually operated switch, a slide gate, a slip blind, a line valve, blocks, and any similar device with a visible indication of the position of the device. (Push buttons, selector switches, and other control-circuit-type devices are not energy isolating devices.)
- 4.7 Grounded, Effectively: Intentionally connected to the earth through a ground connection or connections of sufficiently low impedance and having sufficient current-carrying capacity to prevent the buildup of voltages that may result in undue hazards to connect equipment or to persons.
- 4.8 Hazardous Atmosphere: An atmosphere that may expose team members to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from an enclosed space), injury, or 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 LFL; Note: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.
 - 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 and which could result in team member exposure in excess of its dose or permissible exposure limit;
 - Note: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this definition.
 - E. Any other atmospheric condition that is 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, 1910.1200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.
- 4.9 Insulated: Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to the passage of current.
Note: When any object is said to be insulated, it is understood to be insulated for the conditions to which it is normally subjected. Otherwise, it is within the purpose of this section, un-insulated.
- 4.10 Lines, Communication: The conductors and their supporting or containing structures which are used for public or private signal or communication service, and which operate at potentials not exceeding 400 volts to ground or 750 volts between any two points of the circuit, and the transmitted power of which does not exceed 150 watts. If the lines are operating at less than 150 volts, no limit is placed on the transmitted power of the system. Under certain conditions, communication cables may include communication circuits exceeding these limitations where such circuits are also used to supply power solely to communication equipment.
Note: Telephone, telegraph, railroad signal, data, clock, fire, police alarm, cable television, and other systems conforming to this definition are included. Lines used for signaling purposes, but not included under this definition, are considered as electric supply lines of the same voltage.
- 4.11 Minimum Approach Distances: Ensure that workers do not approach or take any conductive object closer to the energized parts as set forth in section 7.3.3 and Table 3-4. Adjustments to the minimum approach distances may need to be made to account for altitude changes. Changes in the weather have been factored into the minimum approach distances.
- 4.12 Primary Voltage: Any circuit that normally operates at more than 500 volts.

- 4.13 **Qualified Team Member (qualified person):** One knowledgeable in the construction and operation of the electric power generation, transmission, and distribution equipment involved, along with the associated hazards.
Note 1: A team member must have the training required by 1910.269 in order to be considered a qualified team member.
Note 2: Except as provided in 1910.260, a team member who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person is considered to be a qualified person for the performance of those duties.
- 4.14 **Secondary Voltage:** Any supply voltage that normally operates at less than 500 volts.
- 4.15 **Step Potential:** The voltage between the feet of a person standing near an energized grounded object. It is equal to the difference in voltage, given by the voltage distribution curve, between two points at different distances from the "electrode". A person could be at risk of injury during a fault simply by standing near the grounding point.
- 4.16 **Touch Potential:** The voltage between the energized object and the feet of a person in contact with the object. It is equal to the difference in voltage between the object and a point some distance away. It should be noted that the touch potential could be nearly the full voltage across the grounded object if that object is grounded at a point remote from the place where the person is in contact with it. For example, a crane that was grounded to the system neutral and that contacted an energized line would expose any person in contact with the crane or its un-insulated load line to a touch potential nearly equal to the full fault voltage.

5 Policy

- 5.1 Cianbro will lead the Electrical Utility Industry in safety by creating a culture where all team members, subcontractors and partners take personal accountability and ownership to ensure a safe working environment for all.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for deviations from this policy.
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 The corporate safety department is responsible for maintaining this document.

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7.1 General

- 7.1.1 Electrical equipment and lines (overhead or underground) shall always be considered as energized (with potentially fatal voltages) unless they are positively proven to be de-energized and properly grounded. This safety policy and procedure is provided as a support to the minimum standards from OSHA 1910.269.

IF IT ISN'T GROUNDED – IT ISN'T DEAD. ALWAYS INSULATE AND / OR ISOLATE

- Only authorized team members shall work on or near energized lines or equipment.
 - No team members shall approach any exposed ungrounded line work or apparatus unless they are insulated from other conducting surfaces or uses adequate protective devices.
 - Team members shall report immediately to their nearest foreman or supervisor any defective line, tool or other condition which in their judgment may be dangerous either to persons or property or likely to interrupt or delay service.
 - Electrical equipment and lines shall always be considered as "live" unless they are positively known to be de-energized and grounded. Before starting to work, preliminary inspection or test shall be made to determine what conditions exist. Extreme care shall be exercised when handling common neutral conductors as high voltage may be encountered (induction).
 - No work shall be performed in inclement weather on high voltage equipment or lines when conditions are such as to materially increase the hazards of the operations being performed, excepting emergency work necessary to restore service or demanded by the public interest.
- 7.1.2 An activity plan must be written and presented by a Qualified Person, signed and acknowledged by all team members on the site prior to beginning work each day. The plan shall cover at least the following subjects: safety hazards associated with the job, work procedures involved, special precautions, energy source controls, and personal protective equipment requirements. Any changes or deviations from this plan would warrant a subsequent plan and discussion as the work and methodology changes.
- 7.1.3 Team members who are required to work on or in close proximity to overhead or underground electrical lines shall be trained and competent in: (a) the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment, (b) the skills and techniques necessary to determine the voltage of exposed live parts, (c) the minimum approach distances that correspond to the voltages to which the team member will be exposed and (d) the proper use of personal protective equipment, insulation and shielding materials and insulated tools.
- 7.1.4 Only qualified team members or those under the continuous supervision of an experienced journeyman line worker shall work on lines or equipment, which are energized.

- 7.1.5 Project management teams working on transmission and distribution sites shall work with the host facility or client to determine any project or system specific hazards, voltages, available fault currents and incident energy assessments that the host facility is aware of.
- 7.1.6 Cianbro shall advise the host facility or client of any unique hazardous conditions presented by Cianbro's work and of any unanticipated hazardous conditions not mentioned by the host.
- 7.1.7 Cianbro shall coordinate work rules and procedures with the host facility or client to ensure that each team member is protected.
- 7.1.8 Estimates of incident heat energy of electric arc hazards to which a worker would be exposed must be identified, and the team member must be protected by clothing and other protective equipment rated greater than or equal to the estimated heat energy.

7.2 Personal Protective Equipment (PPE)

The information provided below is intended to supplement existing PPE Safety Policy and Procedures.

7.2.1 Wearing Apparel

- A. Rubber glove protectors shall not be used as work gloves.
- B. ARC rated clothing is required at all times when work is performed within applicable minimum approach distances or when electrical contact, induction or energization may occur on any job-site with energized line, cable, or appliances.
- C. A long-sleeved shirt or coveralls with sleeves rolled down shall be worn when climbing and/or working on poles or structures where gloves and / or sleeves are required.
- D. ARC rated clothing requirements will meet a minimum of HRC 2, or higher as required by arc flash hazards, or client/owner requirements. (Other protective devices are to be used in specific types of work to provide adequate personal protection.)
- E. When working on or near live parts, team members shall not wear loose dangling watch chains, key chains or unnecessary metal of any kind.
- F. Team Members working at elevations requiring fall protection that are also exposed to electrical arc hazards or flames shall wear fall protection equipment rated for the incident energy. The fall arrest equipment must be capable of passing a drop test after exposure to an electric arc with a heat energy of 35-45 cal/cm².
- G. Team Members working on transmission line projects shall wear EH rated boots, that are leather and lace up (cowboy style slip on boots are not allowed). Rubber slip on (mud boots) are permitted in muddy and winter conditions.

7.2.2 Use and Care of Rubber Gloves and Sleeves

Classes of rubber gloves manufactured, proof-test voltage and maximum use as specified by ANSI

Class of Glove	AC Proof-Test Voltage rms	DC Proof Test Voltage avg	Maximum Use Voltage AC rms
1	10,000	40,000	7,500
2	20,000	50,000	17,000
3	30,000	60,000	26,500
4	40,000	70,000	36,000

- A. Only qualified team members or those under the continuous supervision of an experienced journeyman line worker shall work on lines or equipment, which are energized.

- B. When rubber glove work is authorized to be performed, use the chart shown above.
- C. Team members shall wear rubber gloves, with leather protectors **ground to ground** when working on lines or equipment energized at voltages below 500 volts.
- D. Team members shall wear rubber gloves **ground to ground** when working on lines and equipment energized at voltages over 500 volts and less than 35,000 unless approved live line tools are used.
- E. Team members shall wear rubber gloves when testing for voltage and when applying and/or removing any ground cable.
- F. Rubber gloves with leather protectors shall also be worn by team members on the ground when:
- Working on or within reaching distance of any electrical equipment and/or conductor which are not effectively grounded and which may become energized (I.E. URD, Substations).
 - While a pole or other conductive structure is being set or removed from proximity of energized primary lines. They shall be put on before pole is raised and worn until pole is set and secured (at voltages over 500 volts and less than 35,000).
 - As requested by supervision or required by the Activity Plan.
 - Opening and closing manually operated oil circuit breakers, air break switches, fuses, or fuse doors on cutouts.
 - Testing to determine if lines are de-energized, and applying and removing grounds.
- G. When working with rubber protective equipment on energized circuits or apparatus the following minimum conditions shall be met, in addition to all other rules governing the use of protective equipment.
- Team members shall not make physical contact with energized conductors, jumpers, or grounds, with other than their rubber gloves.
 - Where the voltage exceeds 5,000 volts between a single phase and ground, team members shall be isolated from all grounds (wooden poles shall be considered as grounds in this case) by using approved supplementary insulation such as aerial baskets, a line worker's platform, or other approved insulated devices.
- H. Rubber gloves shall never be worn inside out or without leather protective covers. They shall be exchanged at any time they become damaged or the team member to whom they are assigned becomes suspicious of them. Leather protectors or over glove covers shall not be worn as work gloves except when in use over rubber gloves.
- I. Rubber sleeves shall be worn when team members are working with energized loose ends or taps.
- J. Rubber gloves and sleeves shall be inspected for corona cracks or other damage and the gloves shall be given an air test each day while in use, at the beginning of the work period and at any other time when their condition is in doubt. They shall be given a visual inspection before each use.
- K. Rubber gloves and sleeves when not in use shall be kept in canvas bags or other approved containers and stored where they will not become damaged from sharp objects or exposed to direct sunlight. They shall never be folded while stored nor shall other objects be placed upon them.
- L. Rubber gloves will be dielectrically tested at a minimum of every six months. Jobs requiring heavy and frequent use of rubber gloves may require more frequent testing.
- M. Rubber sleeves will be dielectrically tested at a minimum of every six months. Jobs requiring heavy and frequent use of rubber sleeves may require more frequent testing.
- N. Rubber gloves shall be stored in the glove bag with the cuffs down to permit drainage, provide better ventilation and reduce the possibility of damage.
- O. Inner liners may be worn if desired.

7.3 Work Practices

7.3.1 Climbing and Working on Poles

- All poles and structures shall be carefully inspected before climbing to assure that they are in a safe condition for the work to be performed and that they are capable of sustaining the additional or unbalanced stresses to which they will be subjected.
- Where poles or structures may be unsafe for climbing, they shall not be climbed until made safe by guying, bracing or by other adequate means. An aerial bucket should be used instead if possible.
- Proper hooks and gaffs are required for climbing wood poles.
- Wires shall not be attached to or removed from a pole or structure until it is certain the pole or structure will withstand the altered strain.
- Worker(s) shall not wear their climbers while driving or riding in vehicles or when doing work on the ground, on ladders (except hook ladders), in aerial lifts or on platforms in which the wearing of climbers creates a hazard.
- Gaffs on climbers shall be kept within safe length limits (1-1/4 inches min.), properly shaped, and sharp.
- Workers shall not work on an elevated pole or structure without first securing themselves with an approved harness or other approved safety device.
- Team members climbing poles shall be protected from a fall by the use of work positioning equipment specially designed to limit a fall to less than two feet. Current examples of approved devices include the: Miller Stop-Fall, Buckingham Buck-squeeze or Supersqueeze, and the Bashlin Pole-lariat.)
- Secondary safety straps shall be used in addition to the work positioning equipment for passing obstacles on the pole (Cianbro provided).
- Metal hooks, chains, etc., for holding tools or tape shall not be attached to body belts. Leather or other non-conducting material shall be used for this purpose.
- The safety strap shall not be put around a pole above the uppermost pole attachment position, except where pole top or attachment is above eye level. It shall not be used on pole steps, cross arm braces, insulators, insulator pins, and conductors, rotten or otherwise weak cross arm or on attachments that are being moved. When it is necessary to safety off to a cross arm, the safety strap shall never be placed that it will not be cut by line equipment or twisted or fouled by material that may give way under strain. The use of a two (2) strap (lanyard) system will be utilized; a minimum of one (1) strap (lanyard) must be in place at all times.
- Line workers shall not trust their weight to guy wires, pins, braces, conductors, or other such equipment that might prove unstable.
- When two or more team members are to work on the same pole at the same time, one shall reach the working position before the next leaves the ground. They shall descend the pole one at a time.
- When climbers (hooks) are stored in the truck or tool room, they shall be placed where the sharp points will not damage other equipment or cause personal injury.
- All other work will refer to standard Cianbro Safety Policy and Procedure(s) for Fall Protection

7.3.2 Working on De-energized Lines and Electrical Equipment

- General- All conductors and/or electrical equipment shall be treated as energized until tested to be de-energized and grounded.
- New construction- New lines and/or electrical equipment may be considered de-energized and worked as such where:
 - The lines or equipment are grounded, or
 - The hazard of induced voltages is not present and adequate clearances or other means are implemented to prevent contact with energized lines or equipment and the new lines or equipment.
- When working on de-energized lines the worker shall work under the tagging orders on whose property the work is performed or to Cianbro's Lock out-Tag out policy as a minimum standard.
- Testing equipment of adequate capacity shall be used to determine whether or not a line and/or equipment are de-energized.

- Grounding equipment shall be used when working on all de-energized circuits and/or equipment.
- Rubber gloves must be worn when sticks are used to test, switch, phase-out, or ground circuits and/or equipment.
- When working in de-energized areas use barricades, signs, tags, and /or other safety means to designate energized lines and/or equipment.
- All tools shall be kept in good working condition, properly stored, and must be restricted to the use for which they are intended.
- Grounding procedures and requirements must be adhered to as defined and depicted in the Cianbro Overhead Protective Grounding Procedures manual. (See section 7.4.2 Grounding).

7.3.3 Working on Energized Lines

- All qualified line workers working on energized conductors and/or electrical equipment over 500 volts shall be assisted by another qualified line worker, or a qualified line worker trainee, on the same pole, structure or location. (Two separate poles or structures may be considered one for the purpose of this rule if both line workers can step to the other pole or structure without descending to the ground to do so.). Unqualified team members must maintain the required clearance distance based on the table OSHA Unqualified Work Distances. See below.
- Qualified team members must adhere to the approach distances in the table below.
- In no case, when working together in pairs, shall line workers work simultaneously on energized wires or equipment of different phases or polarities.
- Before starting work the line worker shall have themselves in such a position that the presence of the second worker does not increase the hazard.
- Qualified line worker trainees may, under the supervision of a First Class line worker, work on energized conductors and/or equipment. Qualified line worker trainees shall be deemed “qualified” by the Training committee.
- Energized conductors and/or electrical equipment shall be handled in accordance with the safety rules, regulations and safe working procedures of the utility on whose property the work is performed, provided a copy of such procedure is made available.

OSHA Unqualified Work Distances (Minimum Approach Distances – Unqualified)

<u>Voltage</u>	<u>Distance</u>
0 - 50,000 volts	10'
69,000 volts	11'
115,000 / 138,000 volts	13'
230,000 volts	15'
345,000 volts	20'

TABLE R-6-ALTERNATIVE MINIMUM APPROACH DISTANCES FOR VOLTAGES OF 72.5 KV AND LESS ¹

Nominal voltage (kV) phase-to-phase	Distance	
	Phase-to-ground exposure	Phase-to-phase exposure
	ft	ft
0.50 to 0.300 ²	Avoid Contact	Avoid Contact
0.301 to 0.750 ²	1.09	1.09
0.751 to 5.0	2.07	2.07
5.1 to 15.0	2.14	2.24
15.1 to 36.0	2.53	2.92
36.1 to 46.0	2.76	3.22
46.1 to 72.5	3.29	3.94

¹ Employers may use the minimum approach distances in this table provided the worksite is at an elevation of 900 meters (3,000 feet) or less. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work.

² For single-phase systems, use voltage-to-ground.

TABLE R-7-ALTERNATIVE MINIMUM APPROACH DISTANCES FOR VOLTAGES OF MORE THAN 72.5 KV ^{1 2 3}

Voltage range phase-to-phase (kV)	Distance	
	Phase-to-ground exposure	Phase-to-phase exposure
	ft	ft
72.6 to 121.0	3.71	4.66
121.1 to 145.0	4.27	5.38
145.1 to 169.0	4.79	6.36
169.1 to 242.0	6.59	10.10
242.1 to 362.0	11.19	18.11
326.1 to 420.0	13.94	22.34
420.1 to 550.0	16.63	27.03
550.1 to 800.0	22.57	37.34

¹ Employers may use the minimum approach distances in this table provided the worksite is at an elevation of 900 meters (3,000 feet) or less. If employees will be working at elevations greater than 900 meters (3,000 feet) above mean sea level, the employer shall determine minimum approach distances by multiplying the distances in this table by the correction factor in Table R-5 corresponding to the altitude of the work.

² Employers may use the phase-to-phase minimum approach distances in this table provided that no insulated tool spans the gap and no large conductive object is in the gap.

³ The clear live-line tool distance shall equal or exceed the values for the indicated voltage ranges.

*See Minimum Approach, definition section

7.3.4 Working on Energized Lines with Live-Line Tools

- A careful check shall be made to see that the condition of the structure and lines at the point of the work is such that the job may be performed safely. In addition, the adjacent spans and structures shall be carefully checked for defects in conductors, tie wires, insulators, and other equipment.
- Planned work with live-line tools shall not be started during unfavorable weather.
- Before work with live-line maintenance tools is begun, the dispatcher or person having jurisdiction shall be notified. If during live-line tools work, an interruption of service occurs, the dispatcher or other person having jurisdiction shall be notified immediately.
- Only approved tooling shall be used in live-line maintenance work.
- Under no circumstances shall a Line worker depend on another Line worker to hold a live conductor clear of him.
- Positive control shall be maintained during the movement of any conductor.
- While live-line work is in progress, no other work of any nature shall be performed on the same pole or structure.
- All live-line tools, when not in use, shall be kept in canvas bags or weatherproof boxes provided for that purpose; these containers shall be stored in dry and, if possible, a warm place.
- Live-line tools shall never be laid directly on the ground or against sharp objects. Special tool holders or tarpaulins shall be used for this purpose.
- All live-line tools shall be visually inspected before use each day. Tools to be used shall be wiped clean, and if any hazardous defects are indicated, these tools shall be removed from service.
- When practical, the automatic reclosing feature of circuit interrupting devices shall be made inoperative before work begins (one shot, non-reclose).
- Careful attention shall be given to avoid mechanical overloading of live-line tools.
- When installing or removing jumpers, only one connection shall be made at a time. Jumper ends not connected shall be secured in such a manner as to prevent unintended contacts.
- Plan each job carefully to provide the maximum clear working space. Guard against contact with conductors other than the one being worked on.
- Approved protection devices shall be placed in position on any and all conductors energized above 5kV when such conductors are within reach of any part of the Team member's body when live line tools are being used. Such conductor guards shall be installed by means of appropriate live line tools if voltages are greater than 15kV, and by wearing class II rubber gloves for voltages less than 15kV.
- Only clean and dry non-conductive line shall be used on energized conductors above 5 kV. Link sticks (non-conductive tooling) shall be used between the rope and conductor on voltages above 15kV.
- Care shall be exercised to prevent the ends of the tie wires, armor rods, or other conductive material from contacting the structure or attached hardware during removal from or installation upon energized conductors.

7.3.5 Working on Transformers

- The primary leads of a distribution transformer shall be considered energized at full voltage until both the primary and the secondary leads have been disconnected, or it has been determined that the secondary circuit to which it is attached is not energized from other transformers.
- The cases of all transformers connected to a source of supply shall be considered as being energized at the full primary voltage unless they are adequately grounded.
- Team members shall not stand on or otherwise contact transformer cases while working on or near energized circuits.

NOTE: Old-type transformer with cast iron cases may weigh about 50% more than the weights listed in chart number 3-8 and will require correspondingly larger rope and blocks. The weights given are for standard distribution transformers.

- Use of rope as a hoist line shall be discontinued when it becomes worn, deteriorated or damaged to a degree that is unsafe.
- Metallic slings (chain or cable) shall not be used for hoisting purposes.
- A non-conductive tag line shall be used on all loads.
- Synthetic hoisting and pulling lines and ropes shall not be considered as non-conductive, unless properly maintained to preserve their insulating qualities.

7.3.6 Fuses

- Rubber gloves shall be worn while opening, closing, removing or replacing hot line clamps, fuses or fuse doors on cutouts even when using an approved switch stick or hot line tool.

7.3.7 Hoisting Cables-Conductive Material

CHART NO. 3-8

**APPROXIMATE TRANSFORMER WEIGHTS
(WEIGHT IN POUNDS)**

KVA	SINGLE PHASE	THREE PHASE
3	210	
5	295	475
7 1/2	405	560
10	420	780
15	545	895
25	700	1440
37 1/2	1010	1580
50	1230	2225
75	1505	2545
100	1720	2635

- Wire rope or other conductive material shall not be used to raise transformers, poles, or any other equipment or materials near energized lines.

7.3.8 Working on Capacitors

- Line capacitors shall be considered at full voltage until they have been disconnected from the line, and the terminals short-circuited and discharged to ground by an approved method.
- The terminals shall not be short-circuited until the capacitors have been de-energized for at least five minutes.
- Line workers shall wear rubber gloves and use a hot stick while shorting and grounding terminals.
- A line worker shall not come in contact with an ungrounded capacitor case until the capacitor has been disconnected from the circuit and the terminals shorted.
- The exposed terminals of line capacitors in storage shall be shorted.

7.3.9 Stringing or Removing De-energized Conductors

- Prior to stringing operations, an Activity Plan shall be written by a Competent person (2nd class or above) and discussed setting forth the plan of operation and specifying the type of equipment to be used, grounding devices and procedures to be followed, methods to be employed, and the clearance authorization required.
- Where there is a possibility of the conductor accidentally contacting an energized circuit or receiving a dangerous induced voltage buildup, to further protect the team member from hazards of the conductor, the conductor being installed or removed shall be considered and worked as energized.
- If the existing line is de-energized, proper clearance authorization shall be secured and the line grounded on both sides of the crossover or, the line being strung or removed shall be considered and worked as energized.

- When crossing over energized conductors in excess of 500 volts, guard structures shall be installed unless provision is made to isolate or insulate the team member or the energized conductor. Where practical the automatic reclosing feature of the circuit-interrupting device shall be made inoperative. In addition, the line being strung shall be grounded on either side of the crossover or considered and worked as energized.
- Conductors being strung in or removed over a road without any energized conductors will have a grounded running block on at least one side of the crossing, in addition to the running ground.
- Conductors being strung in or removed shall be kept under positive control by the use of adequate tension reels, guard structures, tie lines, or other means to prevent accidental contact with energized circuits.
- A transmission clipping crew shall have a minimum of two structures clipped in between the crew and the conductor being sagged. When working on bare conductors, clipping and tying crews shall work between grounds at all times. The grounds shall remain intact until the conductors are clipped in, except on dead-end structures.

7.3.10 Stringing Adjacent to Energized Lines

Prior to stringing parallel to an existing energized transmission line, a competent determination shall be made to ascertain whether dangerous induced voltage buildups will occur, particularly during switching and ground fault conditions. When there is a possibility that dangerous induced voltage may exist, the following provisions apply:

- When stringing adjacent to energized lines, the tension stringing method or other methods that preclude unintentional contact between the lines being pulled and any team member shall be used.
- All pulling and tensioning equipment shall be isolated, insulated or effectively grounded.
- All pulling and tensioning equipment will be fully barricaded to prevent touch potential hazards from site visitors or TMs not directly involved in wire pulling operations.
- A ground shall be installed between the tensioning reel setup and the first structure in order to ground each bare conductor and overhead ground conductor during stringing operations (running ground).
- During stringing operations, each bare conductor and overhead ground conductor shall be grounded at the first tower adjacent to both the tensioning and pulling setup and in increments so that ground location is never more than 2 miles apart.
- The grounds shall be left in place until conductor installation is completed.
- Aerial grounds shall be removed when work activities requiring their use have been completed.
- Except for moving type grounds, the grounds shall be placed and removed with a hot stick.
- Conductors and Overhead ground conductors shall be grounded at all dead-end or catch-off points.
- A ground shall be located at each side and within 10 feet of working areas where conductors or overhead ground conductors are being spliced at ground level. The two ends to be spliced shall be bonded to each other.
- All conductors and overhead ground conductors shall be bonded to the tower at any isolated tower where it may be necessary to complete work on the transmission line.
- Work on dead-end towers shall require grounding on all de-energized lines.
- Grounds may be removed as soon as the work is completed, provided that the line is not left open circuited at the isolated tower at which work is being completed.
- When performing work from the structures, clipping crews and all others working on conductors or overhead ground conductors shall be protected by personal protective grounds installed at every work location.

7.3.11 Pole Hauling and Temporary Storage

- The trailing end of a load of poles shall be marked by a red flag during the day and a red light at night. As an additional precaution, warning flags or lights may be

placed in the center of long loads. A team member shall be used for flagging when necessary.

- If it becomes necessary to store poles at the location where they are to be set, they shall be so placed that they will not interfere with traffic.
- If poles left on or near streets, highways or walkways overnight creating a hazard, they shall be safeguarded by lights or well-lighted warning signs.
- Poles shall be placed or blocked so that they will not roll.
- Team members shall not remain on a pole pile while poles are being hoisted.
- Poles loaded on a truck or trailer shall be securely fastened every ten (10) feet.
- When a load of poles is within working distance of the ground, load binders shall be installed so that they can and will be operated by team members while standing on the ground.
- Team members shall not ride pole dollies or trailers.
- The wheels of the transporting vehicle shall be chocked or securely braked prior to loading.

7.3.12 Setting and Removing Poles

- If any holes are left unfilled at the end of the work period, they shall be protected with secured coverings (capable of supporting pedestrian traffic) with a sign stating "hole".
- All persons not engaged in pole-setting operations shall keep out of the work area.
- While setting or removing poles between or within minimum clearance distances of conductors energized above 500 volts:
 - If safe clearance cannot be maintained, the conductors shall be de-energized, covered with protective devices, spread apart, or a pole guard shall be used, to minimize accidental contact.
 - Workmen handling the butt of the pole shall wear rubber gloves and sleeves whether or not cant hooks, peaveys or slings are used.
 - Until a pole is positively secured from moving against and energized conductor, no one shall step on or off the truck or pole trailer, nor shall a team member standing on the ground touch any part of the truck or pole trailer without using rubber gloves.
 - Ground wires shall not be attached to the pole higher than 10 feet from the ground.
- When pikes are used to hold poles in place while holes are being backfilled, they shall be firmly secured until the backfill is sufficient to hold. When a pole is being "canted" or "hooked", the pikes shall be held.
- Team members shall not stand or pass under a suspended load or adjacent to or over or under a loaded winch line.
- Team members engaged in handling or working on poles shall wear suitable gloves and shall wear a shirt or jacket with the sleeves rolled down.
- Hoisting equipment operators shall accept signals only from the worker specifically designated. The operator shall obey a stop signal given by anyone.
- The operations of setting a pole in an energized line shall require two (2) qualified team members (minimum). The number of team members utilized will depend on the work to be done. Additional qualified personnel will be assigned whenever required to perform the work safely.

7.4 Insulating & Isolating

7.4.1 Insulating Protective Equipment (Rubber, Synthetics, Etc.)

- Team members shall not touch or work any exposed energized lines or apparatus except when wearing protective equipment approved for the voltage to be contacted.
- When work is to be done on or near energized lines or equipment, all energized and grounded conductors, guy wires or equipment within reach of any part of the body shall be covered with protective equipment, except that part of the conductor on which the team member is working.
- When working on energized lines or apparatus, including the installation of protective devices, work should be done from below, if possible.

- In applying flexible protective equipment, a team member shall always protect the nearest and lowest wires first, protecting themselves as they progress. In removing rubber protective equipment, the reverse order shall be maintained.
- Flexible blankets shall not be used on the ground without protecting them from physical damage and moisture by means of a tarpaulin, canvas, or protective mat.
- Protective equipment shall be put on before entering the work area within which energized lines or apparatus may be reached, and the protective equipment shall not be removed until the team member is completely out of reach of this area.
- To avoid corona and ozone damage, rubber protective equipment shall not be allowed to remain in place on energized lines or apparatus overnight or for more than one eight-hour period, unless approved by the supervisor in charge.
- Line hose, hoods, blankets, line guards, etc. shall be visually inspected before each job.
- Line hoses, hoods, etc. issued for service shall be tested. The interval between date of issue and retests shall be based on work practices and test experience, but shall not exceed one (1) year. Blankets shall be tested electrically, every six (6) months.
- Where visual inspection indicates that there may be reason to suspect the electrical integrity of flexible protective equipment, the equipment shall be removed from service until an electrical test shall be performed before reissuing the equipment for service.
- Flexible protective devices shall be stored in special compartments on trucks and elsewhere where they will not be subjected to damage from tools or other equipment.
- Electrical cords or electric power tools shall not be used near or above energized lines or equipment exceeding 5kV.

7.4.2 Grounding

- All conductors and/or electrical equipment shall be treated as energized until tested to determine that it is de-energized and grounds can be installed.
- New lines or equipment may be considered de-energized and worked as such where:
 - The lines or equipment are grounded, or
 - The hazard of induced voltages is not present and adequate clearances or other means are implemented to prevent contact with energized lines or equipment and the new lines or equipment.
- De-energized conductors and equipment that are to be grounded shall first be tested for the presence of voltage.
- Grounds (personal) shall be installed at each worksite. A grounding "cluster" bracket shall be attached to the pole at a point below the work area. Do not use the Down Ground on the pole, as part of equi-potential, personal protective grounding.
- Attached grounds.
 - When attaching grounds, the ground end shall be attached first, and the other end shall be attached and removed by means of insulated tools and rubber gloves.
 - When removing grounds, the grounding device shall first be removed from the line or equipment using insulated tools and rubber gloves and then from the ground connection (system neutral or driven ground rod).
- Where the making of a ground is impracticable, or the conditions resulting there from would be more hazardous than working on the lines or equipment without grounding, the grounds may be omitted and the line or equipment worked as energized.
- Grounds may be temporarily removed only when necessary for test purposes and extreme caution shall be exercised during the test procedures.
- Grounding to tower shall be made with a tower clamp capable of conducting the anticipated fault current.
- A ground lead, to be attached to either a tower ground or driven ground, shall be capable of conducting the anticipated fault current and shall have a minimum conductance of 2/o AWG copper.

- Grounding equipment shall be of sufficient current carrying capacity to actuate protective devices such as oil circuit breakers, relays, etc., without destroying the grounding equipment.
- All grounding equipment shall be inspected prior to use for scarred insulation, pressed ferrules and other defects.
- Grounding procedures and requirements must be adhered to as defined and depicted in the Cianbro Overhead Protective Grounding Procedures manual.

7.5 Rigging and Equipment

7.5.1 Derrick Trucks, Cranes, Etc.

- All work performed by crane must conform to Cianbro's Safety Policy and Procedure # 28 (Crane Safety) With the exception of equipment certified for work (Digger Derricks / Material Handling Buckets) on the proper voltage, mechanical equipment shall not be operated closer to any energized line or equipment than **10 feet** unless (and when operated by trained personnel). Unless one or all of the below mentioned criteria are met:
 - An insulated barrier is installed between the energized part and the mechanical equipment
 - The mechanical equipment is grounded
 - The mechanical equipment is considered as energized.

CHART NO. 5-1.1

POLES – AVERAGE WEIGHTS (When Furnished To A.S.A. Specifications)

It should be understood that pole, even within the same class, vary in diameter and hence weight. Also, the moisture content of a pole changes under various conditions; therefore the weights given in these tables should be taken as average values only, but they should prove sufficiently reliable.

	WESTERN RED CEDAR					CLASS			
Length (ft.)	1	2	3	4	5	6	7	8	9
30	1000	850	730	610	500	420	350	325	250
35	1200	1000	850	750	650	560	470	450	
40	1500	1300	1100	900	800	700			
45	1800	1550	1300	1150	1000				
50	2000	1800	1550	1400	1300				
55	2300	2000	1750	1600	1600				
60	2600	2200	2000	1900					
65	3200	2500	2300	2200					
70	3600	3000	2700	2600					
75	4200	3600	3100	3000					
80	5000	4200	3600	3500					
85	5500	4500	4000						
90	6600	5600	4800						

7.5.2 Rope

- A rope shall not be overloaded or dragged over rough or sharp objects.
- Short bends over sharp-edged surfaces shall be avoided.
- Kinks shall be removed before any strain is put on a rope.
- When not in use, rope shall be dried and stored properly and kept free from mechanical damage and excessive heat and dryness.
- Rope shall be examined regularly for cuts, worn spots, burns and rot. The rope shall be untwisted at various places and inspected for poor fiber and dry rot.

- The outward appearance of rope shall not be accepted as proof of quality or strength.
- Hand lines shall be a minimum of 1/2-inch diameter and have a strength equivalent to 1/2-inch manila (minimum).
- Eyes and splices shall be made in accordance with the instructions given by the rope manufacturer.
- The “safe load” rating for the rope must be known and may never be exceeded.
- All rope shall be properly coiled and stored when not in use and kept free from contaminates and moisture

CHART NO. 5-2

Safe Loads on NEW 3-Strand Manila Rope

Diam. in Inches	Circum. in Inches	Approx. Wt. per ft. in Pounds	SINGLE ROPE		TWO PART SLING		
			Breaking Strength	Safe Load	 60°	 45°	 30°
1/4	3/4	.020	600	120	210	170	120
3/8	1-1/8	.041	1350	270	470	380	270
1/2	1-1/2	.075	2650	530	920	750	530
5/8	2	.133	4400	880	1520	1245	880
3/4	2-1/4	.167	5400	1080	1870	1530	1080
7/8	2-3/4	.225	7700	1540	2660	2180	1540
1	3	.270	9000	1800	3100	2545	1800
1-1/8	3-1/2	.360	12000	2400	4150	3395	2400
1-1/4	3-3/4	.418	13500	2700	4670	3820	2700
1-1/2	4-1/2	.600	18500	3700	6400	5230	3700
1-5/8	5	.744	22500	4500	7785	6360	4500
1-3/4	5-1/2	.895	26500	5300	9170	7495	5300
2	6	1.080	31000	6200	10725	8770	6200

Safe Loads on NEW Synthetic Fiber Rope

Dia- meter Inches	Circum- ference. Inches	NYLON			POLYPROPYLENE		
		Pounds per 100 ft.	Tensile Strength Pounds	Safe Load Pounds	Pounds per 100 ft.	Tensile Strength Pounds	Safe Load Pounds
1/4	3/4	1.54	1500	300	1.56	1200	240
3/8	1-1/8	3.50	3500	700	2.78	2500	500
1/2	1-1/2	6.06	6000	1200	4.76	4300	860
5/8	2	10.30	10000	2000	8.00	6700	1340
3/4	2-1/4	13.90	14000	2800	10.50	9000	1800
7/8	2-3/4	20.00	19000	3800	14.28	11500	2300
1	3	24.40	24000	4800	18.10	14000	2800
1-1/8	3-1/2	33.30	30000	6000	22.22	17000	3400
1-1/4	3-3/4	38.40	35000	7000	26.70	19000	3800
1-1/2	4-1/2	55.50	50000	10000	36.30	27500	5500
1-5/8	5	66.60	62000	12400	45.45	33000	6600
1-3/4	5-1/2	80.00	75500	15000	55.50	40000	8000

7.6 Underground

7.6.1 Opening and Guarding Holes

Whenever the cover is to be removed from a manhole or a vault, or when any other obstruction to traffic exists, the following precautions shall be taken.

- All obstructions to traffic shall be guarded by adequate signs, barricades, lights, or flags. Traffic shall be warned in advance through the use of signs, high-level standards, flashing lights, traffic cones or flaggers, as may be required by the situation. Please see Cianbro Safety Policy and Procedure # 35 regarding to a Traffic Safety Plan to be attached to the daily Activity Plan.
- Where permissible and practicable, the truck shall be placed to guard the work area against oncoming traffic.
- A blow torch or other open flame shall never be used to melt ice around a manhole or vault cover.
- Manhole, vault and service-box covers shall always be removed and replaced by means of approved hooks and hoists.
- All opened holes must be immediately protected by a suitable / approved barricade.

7.6.2 Entering Underground Structures

Refer to Cianbro Safety Policy and Procedure # 19 for further reference

- All team members required to enter into confined or enclosed spaces shall be instructed (trained) in Confined Space entry (Permitted and Non-Permitted) prior to being allowed entry to an underground structure.
- Before a team member enters a street opening, such as a manhole or an unvented vault, it shall be promptly protected with a barrier, temporary cover, or other suitable guard with an approved retrieval system.
- All manholes must be thoroughly tested for explosive atmosphere and air quality prior to entry. All testing apparatus must remain in place while the manhole is occupied. Mechanical ventilation must be in place at all times.
- All team members entering a Permitted or Non-Permitted structure must wear an approved full body harness and be attached to an approved tether and retrieval system.

- A ladder shall always be used in entering or leaving a manhole or vault. Climbing into or out of manholes or vaults by stepping on cables or hangers is forbidden.
- While work is being performed in manholes, an “attendant” shall be available in the immediate vicinity to render emergency assistance as may be required. This shall prevent the team member in the immediate vicinity from entering a manhole, other than in an emergency.
- Before any work is done on a cable, it shall be identified by an approved method. If there is any doubt as to the identification, work shall not be started until it is checked and identified by the proper authority. The procedure for this process is:
 - Open circuit
 - Verify zero voltage
 - Ground the circuit
 - Purge the circuit

7.6.3 Work adjacent to an Energized Cables (500 volts or under)

- All ground cables and apparatus carrying current at voltage above 500 volts shall be de-energized before work is done on the conductor or before the cables are cut into or spliced.
- Before any work is done on an energized cable, other cables and all grounded equipment with which contact can be made while working on the energized cable shall be covered with rubber blankets or approved insulating shields.
- Because of the characteristics of a low voltage network system, when work is performed on cables or apparatus carrying less than 500 volts, team members shall take extra precautions in the use of necessary rubber protective equipment, in observing adequate clearances and in using proper tools in order to prevent short circuits.
- Team members shall wear rubber gloves with leather protectors, sleeves and stand on rubber (grounding) mats or use insulated tools while cutting into and removing sheathing or sleeves and while testing an energized cable.
- Immediately after each conductor of an energized multiple conductor cable is cut in two, the ends shall be insulated before another conductor is cut. During the course of the work, only one uninsulated conductor shall be exposed at any one time.

7.6.4 Work on De-Energized Cables Greater or Less Than 500 Volts

- When cables and apparatus are taken out of service to be worked on, the accepted procedures for “lock out, tag out” apply (See Safety Policy and Procedure # 16 for “Zero Energy State”).
- Before making an opening in or removing a part of the sheath or sleeve of a cable, the line shall be grounded at the first possible grounding point on each side of the work location. The procedure for this process is:
 - Open the circuit and tag it.
 - Verify zero voltage
 - Ground the Circuit
 - Purge the cable
- When a high voltage cable is to be cut, the cable shall be tested at the work location by an approved testing method to determine whether or not the cable is de-energized. If no indication of a live cable is obtained, the team member may proceed with the work.
- When cutting or opening joints on low voltage cables, the same procedure as outlined above for high voltage cables shall be followed, except in testing. To determine whether the conductor is energized, the insulation shall be cut away to the conductor and tests made with an approved tester. On multiple conductor cables, only one conductor shall be cut into at a time, and tests shall be made on at least two conductors before proceeding with work.

7.6.5 Pulling Cables

- Team members shall not handle pull-wires or pulling-lines within reaching distance of blocks, sheaves, winch drums or take-up reels.

- Pull-wires, steel pulling-lines or metal rodding shall not be pushed through ducts where energized equipment is present unless another team member is stationed at the other end of the run.
- Team members shall not remain in a manhole or vault during pulling operations.
- Communications between manholes must be maintained.
- When pulling cable into vaults, manholes, or duct, care shall be exercised to protect team members and the public from possible injury. Vehicular and pedestrian traffic at the work location shall be studied long enough to enable the equipment to be set up in the safest manner possible.
- A team member or suitable warning sign or barricade, must be stationed alongside a cable, snake wire or pulling rope laid out on the sidewalk or street pavement; cables laid across sidewalks temporarily during pulling operations shall be properly guarded, to reduce the hazard to pedestrians and other traveling public.

7.7 Underground Residential

Introduction

Underground Residential Distribution (URD) systems have a number of apparent advantages over overhead systems; however, they also have some disadvantages such as confined working spaces, closer clearances between energized parts and greater exposure to all types of grounds. In most cases, if protective devices are not used, the team member will be in direct contact with the ground or grounded equipment. This contact completes half of an electrical circuit. If these contacts are not avoided, or protection against contact is not used, serious injury can result.

7.7.1 URD-General

- Before a URD transformer enclosure is opened, all unauthorized persons including the public shall be required to leave the work area, and remain clear of all hazards involved in the work. Proper barricading of the work site shall be utilized.
- When underground equipment is being located, previously buried short sections of scrap cable could provide false indications of the actual position of permanent conductors. Therefore, all scrap cable, regardless of length, is to be removed from the job site.

7.7.2 Opening and Closing Circuits-URD

- All "lock-out, Tag-out" policies apply to URD work (See Safety Policy and Procedure # 16 for "Zero energy State")
- When a URD circuit has opened, the route of the circuit shall be patrolled for obvious hazards before the circuit is reclosed.
- An approved switching tool and rubber gloves with sleeves shall both be used when switches (including secondary breakers) in an energized circuit are opened or closed.
- Any URD primary circuit shall be de-energized by opening one or more devices. De-energized shall be done with load break elbow connectors, load break fuse cutout at the riser pole, load break tool or other approved device.
- Eye and face protection shall be worn when primary switching operations are performed.

7.7.3 Grounding-URD

NOTE:

A capacitance charge can remain in a URD cable after it has been disconnected from the circuit and a static-type arc can occur when grounds are applied to these cables).

- All URD cables and equipment, including services, that have been energized or could become energized from any source, shall be considered as energized until the equipment is positively proven (tested) to be de-energized and has been grounded.
- *Before performing work on de-energized primary circuits or equipment:*
 - (1) a visible open break shall be provided;
 - (2) a voltage test shall be made and
 - (3) the equipment shall be grounded.

- When work is to be done on equipment or cables of an underground system, precautions to prevent back feed shall be taken. This shall include grounding of the secondary conductors where applicable.
- De-energized cables shall be grounded at a point as close to the work as possible before work is started.
- All underground cables and apparatus carrying at voltages shall be de-energized and grounded before cables are cut into or spliced.

7.7.4 Rubber Glove and Sleeve Use-URD

- Rubber gloves and sleeves shall be worn before any URD compartment or enclosure (including a service pedestal) is opened.
- Rubber gloves and sleeves shall be worn when removing animals, vines, weeds, grass or vegetation of any kind that has grown into an energized URD installation whether the equipment is opened or closed.
- Rubber gloves shall be worn when energized primary cables are moved, handled or protected, when work is performed on energized secondaries and services, and when working on or contacting a neutral.

7.7.5 Work on Energized Equipment-URD

Please refer to Cianbro Safety Policy and Procedure # 20 (Flash Protection) for performance of this work.

- When work is performed on cables or apparatus carrying less than 500 volts, team members shall take extra precautions in the use of necessary rubber protective equipment, in observing adequate clearances, and in using proper tools in order to prevent short circuits.
- When energized pad-mounted transformers are unlocked and opened, they shall be directly attended by a team member. They shall be kept closed and locked at all other times.
- A primary or secondary system neutral on any energized circuit shall both be opened under any circumstances.
- Elbow connectors provide a great deal of flexibility in switching and system sectionalizing. However, only those connectors designed and approved for load break use shall be used to connect or disconnect an energized circuit.
- Only tools with insulated handles shall be used for making energized secondary connections or when work is performed within energized service pedestals, pad-mount compartments or submersible transformer enclosures.
- Only one energized secondary or service conductor shall be worked on at any one time, and protective devices shall be used to *insulate or isolate* it from all others.
- Before any attempt is made to replace a damaged or blown cable limiter, the customer's service will be checked for faults by the use either and ohmmeter or a voltmeter.
- Appropriate clothing with full-length sleeves, rolled down, shall be worn when work is performed with rubber gloves and sleeves.

7.7.6 Excavations-URD

Please refer to Cianbro 004 Excavation Safety Policy and Procedure for performance of this work.

- Mechanical excavating equipment shall be used only in areas where there is no known danger of contacting or damaging buried facilities.
- Whenever excavating is done in close proximity (within 18" of mark out) to buried facilities, it must be done only by hand digging. Suitable gloves shall be worn when using any equipment or tools to excavate, expose or handle secondary cables. They shall also be used when digging with approved hand tools to expose primary cables.
- Before excavating in any area where any buried facilities are suspected, such facilities shall be notified of the proposed work. (*DIG SAFE or appropriate agency*). All appropriate DIG SAFE numbers shall be noted within the Daily Activity Plan.
- If electric cables are damaged, the following steps shall be taken:
 - Stop all activity, shut off all vehicles and shield the public
 - Notify your Supervisor and Dig Safe and Cianbro Safety.

- If the damaged cable belongs to a power company other than the one performing the work, this company shall be notified at once.
- The area shall be barricaded and the public kept out until hazardous conditions can be eliminated.
- If gas lines are damaged, the following steps shall be taken as soon as possible:
 - Stop all activity, shut off all vehicles and shield the public.
 - The hole shall be left open to allow the gas to dissipate into the atmosphere. All possible sources of igniting the gas shall be removed or eliminated.
 - Residents of the area shall be warned when necessary and the public kept out of the area.
 - The following departments shall be notified immediately (As identified within the Daily Activity Plan):
 - Local Fire
 - Dig Safe or appropriate agency
 - Gas Company
 - Cianbro Safety
- If communication cables are damaged, the communication company shall be notified at once.
- When trenches are left open, warning devices, barriers, barricades or guardrails shall be placed to adequately protect the public and team members.

7.8 General Excavation and Shoring

All work should be performed within the guidelines presented by Cianbro 004 Excavation Safety Policy and Procedure as reference.

7.8.1 Working in the vicinity of heavy equipment (Ditching Machines)

- Ditching machines shall not be used on slopes or inclines without first preparing the right-of-way to prevent overturning.
- Team members (other than the operator) shall not stand with hands or feet resting on a machine while it is running and shall keep clear of conveyor or discharge side.
- Trenching machines, which are parked or operating on streets or highways, shall be protected by proper warning devices.
- When it is necessary to leave excavating equipment unattended, the blade, or scoop shall be lowered to the grounded, and the ignition system locked.

7.9 Tree Trimming Activities in the Vicinity of Power Lines

It is expected that Cianbro will normally subcontract tree trimming activities around power lines but this section applies to subcontractors and to Cianbro team members if performing this work. Cianbro team members performing this work must be trained to do the work safely.

7.9.1 Prior to climbing, entering, or working around any tree, the nominal voltage of electric power lines posing a hazard to team members shall be determined.

7.9.2 Insulating equipment must be used when removing tree branches that have the potential to cause electrocution (branches that are contacting energized conductors, or are within the distances specified in Tables R-6, R-9, and R-10 of 1910.269, or branches whose potential movement from wind or work activities would place it within those distances).

7.9.3 Line clearance tree trimming work shall not be performed in weather conditions that make the work too hazardous to perform safely. Thunderstorms in the immediate vicinity, high winds, snow storms and ice storms are presumed to make the work too hazardous.

7.9.4 Team members shall be trained in the safe use of brush chippers. Brush chippers must have either a mechanical in-feed system or be equipped with an in-feed hopper that is long enough to prevent team members from contacting the blades during operation.

7.9.5 Team members must be trained in the safe use of power saws. Saws must be turned off when the saw is being carried up a tree by a team member.

7.9.6 Team members required to use climbing ropes shall have been trained in how to climb safely. All climbing ropes must be inspected for damage or defects prior to each use. It is not expected that Cianbro team members will be expected or allowed to climb using climbing ropes. Alternate methods shall be developed such as using an aerial lift.

7.10 Safety At Home

Whenever trimming trees or brush at home, never attempt to do it around energized power lines. Ask trained professionals to do it for you or have the power company shut the power off. Never touch a live power line with your body, with a tool or with any ladder.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all PPE requirements under this policy and to provide necessary training.

9 Related Documents

9.1 Not Applicable

Policy Number 047**Authorized By:** Michael W. Bennett**Title:** Process Safety Management of Highly Hazardous Chemicals (PSM)**Effective Date:** 12/01/08Page 1 of 3

1 Status

- 1.1 Update of existing policy, effective 03/07/13.

2 Purpose

- 2.1 To provide guidance to Cianbro team members working at facilities covered under the PSM standard.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Covered Process: A process is any activity or combination of activities including any use, storage, manufacturing, handling or the on-site movement of highly hazardous chemicals above threshold quantities (See Appendix A of 29 CFR 1910.119). A process includes any group of vessels which are interconnected and separate vessels which are located such that a HHC could be involved in a potential release.
- 4.2 Highly Hazardous Chemical (HHC): A substance possessing toxic, reactive, flammable, or explosive properties. The list of highly hazardous chemicals and their threshold quantities is contained in Appendix A of 29 CFR 1910.119.

5 Policy

- 5.1 Cianbro will understand and protect against the risks associated with work on processes that involve highly hazardous chemicals by following the requirements in this policy, OSHA 1910.119 and other client specific policies.

6 Responsibilities

- 6.1 The manager of the job site is responsible for the implementation of this policy on the job site.
- 6.2 Corporate Safety is responsible for maintaining this document.

7 Process Safety Management of Highly Hazardous Chemicals (PSM) Index

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7.1 Introduction

7.1.1 The Process Safety Management (PSM) of Highly Hazardous Chemicals (HHCs) standard, 29 CFR 1910.119 is intended to prevent or minimize the consequences of a catastrophic release of toxic, reactive, flammable or explosive HHCs from a process. The standard applies to any process which contains a threshold quantity or greater amount of a toxic or reactive HHC as specified in Appendix A. It also applies to storage of 10,000 pounds or greater amounts of flammable liquids and gases and to the process activity of manufacturing explosives and pyrotechnics.

7.1.2 Cianbro team members are sometimes asked to work on covered processes and in areas that are covered under the PSM standard. In these instances, the host facility must have a PSM program that will need to be communicated and followed prior to and during our work activities.

7.2 Elements of the PSM Standard

The host facility is responsible for complying with and addressing the following;

7.2.1 Process Safety Information - The host must compile written process safety information (PSI) including hazard information on HHCs, technology information and equipment information on covered processes.

7.2.2 Employee Involvement - The host must develop a written plan of action regarding team member participation that includes;

- Consulting with employees and their representatives on the conduct and development of process hazard analyses and on the development of other elements of process safety management required under the rule.
- Providing to employees and their representatives access to process hazard analyses and to all other information required to be developed under the rule. This includes host facility employees and Cianbro team members.

7.2.3 Operating Procedures - The host must develop written Operating Procedures that provide clear instructions for safely conducting activities involving covered process consistent with PSI. They must also include steps for each operating phase, operating limits, safety and health considerations and safety systems and their functions. These operating procedures must be readily accessible to employees who work on or maintain a covered process including Cianbro team members, be reviewed as often as necessary to assure they reflect current operating practice, and must implement safe work practices to provide for special circumstances such as lockout/tagout and confined space entry.

7.2.4 Training - The host must ensure that employees operating a covered process are trained in the overview of the process and in the operating procedures addressed previously. This training must be documented and emphasize specific safety and health hazards, emergency operations and safe work practices. Training must occur before initial assignment and then documented refresher training is required at least every three years.

- 7.2.5 Contractors - The host must ensure that PSM requirements are communicated to all Cianbro team members involved in maintenance, repair, turnaround, major renovation or specialty work, on or near covered processes. Cianbro is required to ensure that;
- Our team members and subcontractors are trained to safely perform their jobs.
 - Team members and subcontractors receive and understand the required PSM training.
 - Team members and subcontractors know about potential process hazards and the host facilities emergency action plan.
 - Team members and subcontractors follow the safety rules of the facility. Team members who fail to follow the safety rules will be subject to the Progressive Discipline Policy.
 - The host is notified immediately of any potential hazards that our work poses or hazards that we identify during the course of the work.
- 7.2.6 Mechanical Integrity - The host must establish and implement written procedures for the ongoing integrity of process equipment particularly those components which contain and control a covered process.
- 7.2.7 Hot Work - The host must issue hot work permits prior to any hot work operations conducted on or near a covered process. Cianbro must ensure that these permits are completed and in place prior to starting our hot work.
- 7.2.8 Management of Change - The host must establish and implement written procedures to manage changes except "replacements in kind" to facilities that affect a covered process. The standard requires the host and Cianbro to inform and train their affected team members on the changes prior to start-up. Process safety information and operating procedures must be updated as necessary.
- 7.2.9 Incident Investigation - The host must investigate as soon as possible (but no later than 48 hours after) incidents which did result or could reasonably have resulted in catastrophic releases of covered chemicals. The standard calls for an investigation team, including at least one person knowledgeable in the process involved, (a Cianbro team member when the incident involved a Cianbro activity) and others with knowledge and experience to investigate and analyze the incident, and to develop a written report on the incident. Cianbro will notify the host of any such incidents or near misses immediately. We will participate in the host's investigation but we will also implement our own internal incident investigation processes making the information available to the host.
- 7.2.10 Emergency Planning and Response - The host must develop and implement an emergency action plan. The emergency action plan must include procedures for handling small releases.
- 7.2.11 Trade Secrets - The host must set requirements similar to the trade secret provisions of the 1910.1200 Hazard Communication standard requiring information required by the PSM standard to be available to applicable team members. The host may enter into a confidentiality agreement with team members to prevent disclosure of trade secrets. Cianbro team members must honor this agreement.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 Policy #012 Hazard Communication Program.

Policy Number 048**Authorized By:** Michael W. Bennett**Title:** Ionizing Radiation**Effective Date:** 12/01/08Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 Although infrequent, Cianbro team members have the potential for exposure to varying levels of ionizing radiation on particular sites and during specific activities. This exposure may range from daily exposures at a Nuclear Facility to being adjacent to radioactive devices in industrial facilities or to x-ray equipment during QA/QC activities. In some cases, properly trained team members may even engage in hands on operation of x-ray equipment while verifying the quality of welds. The purpose of this policy is to identify and address requirements for working in or adjacent to areas with potential for team member exposure to ionizing radiation.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 ALARA is an acronym for **As Low As Reasonably Achievable**: This is a radiation safety principle for minimizing radiation doses and releases of radioactive materials by employing all reasonable methods. ALARA is not only a sound safety principle, but is a regulatory requirement for all radiation safety programs.
- 4.2 Dose: The total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during a set period of time. Several different units of dose are in current use but most entities use Rad, Millirad (1000 rad), Rem or Millirem (1000 rem) to measure dose.
- 4.3 High Radiation Area: Any area, accessible to team members, in which there exists radiation at such levels that a major portion of the body could receive, in any one hour, a dose in excess of 100 millirem.
- 4.4 Ionizing Radiation: Any electromagnetic or particulate radiation capable of producing ion pairs by interaction with matter. The scope is limited to X-rays and gamma rays, alpha particles, beta particles (electrons), neutrons, and charged nuclei.
- 4.5 Personal Monitoring Equipment: Devices designed to be worn or carried by an individual for the purpose of measuring the dose received (e.g., film badges, pocket chambers, pocket dosimeters, film rings, etc.).
- 4.6 Rad: A measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit of mass of the tissue.
- 4.7 Radiation: Alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other atomic particles; but such term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

- 4.8 Radiation Area: Any area, accessible to team members, in which there exists radiation at such levels that a major portion of the body could receive, in any 1 hour, a dose in excess of 5 millirem, or in any 5 consecutive days a dose in excess of 100 millirem.
- 4.9 Radiation Safety Officer (RSO): A team member who has demonstrated, through training and experience, the ability to effectively manage all aspects of the site radiation safety policy. In most cases, this will be the site safety specialist.
- 4.10 Radiation Tape: Yellow tape with magenta (purplish-pink) wording or radiation symbols continuously along the tape. The tape is used to warn of a radiation hazard inside of an area.
- 4.11 Radioactive Material: Any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.
- 4.12 Radon: A naturally occurring chemical element formed as part of the normal radioactive decay chain of uranium. Uranium has been around since the earth was formed and its most common isotope has a very long half-life (4.5 billion years). Uranium, radium, and thus radon, are considered to be a health hazard due to its radioactivity and will continue to occur for millions of years at about the same concentrations as they do now.
- 4.13 Rem: A measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose of 1 roentgen (r) of X-rays. The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions for irradiation.
- 4.14 Restricted Area: Any area where access to which is controlled by the employer for purposes of protection of individuals from exposure to radiation or radioactive materials.
- 4.15 Survey: An evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific set of conditions.
- 4.16 Unrestricted Area: Any area access to which is not controlled by the employer for purposes of protection of individuals from exposure to radiation or radioactive materials.

5 Policy

- 5.1 All team members working with or exposed to ionizing radiation sources must either be thoroughly trained in radiation safety based on their potential exposure risk, or be under the direct supervision of a trained individual.

6 Responsibilities

- 6.1 The top Cianbro manager of the job site is responsible for the implementation of this policy and identifying the site Radiation Safety Officer.
- 6.2 The site Radiation Safety Officer is responsible for the training of authorized team members, radiation surveys (where required by the applicable state), distribution of dosimetry, maintenance of exposure records (including reporting of quarterly exposure records to applicable State entities, where required), procedural compliance, and all other radiation safety requirements. The RSO will also be responsible for monitoring the safe use and storage of any devices (XRF) that emit ionizing radiation.
- 6.3 Corporate Safety is responsible for maintaining this document.

7 Ionizing Radiation Policy Index

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7.1 Exposure Limits

- 7.1.1 High doses of Ionizing Radiation can lead to health effects such as skin burns, hair loss, birth defects, illness, cancer and even death depending on the dose and the period of time over which it is received. Team member exposures to Ionizing Radiation must be kept to an absolute minimum knowing that there are safe, acceptable limits of exposure. As an employer, Cianbro shall not possess, use, or transfer sources of ionizing radiation in such a way that it may cause any team member in a restricted area during a period of one calendar quarter, to receive a dose in excess of the limits specified in Table 1:

TABLE 1

	Rems per calendar quarter
Whole body: Head and trunk; active blood-forming organs; lens of eyes; or gonads	1 1/4
Hands and forearms; feet and ankles	18 3/4
Skin of whole body	7 1/2

7.2 Precautionary Procedures and Personal Monitoring

7.2.1 Precautionary Procedures

- All sites which have potential for team member exposure to ionizing radiation must identify a Radiation Safety Officer who can manage all applicable aspects of this policy. The RSO must be deemed competent by the site management team based on a combination of training, experience, and proven ability to enforce policies and effectively manage other team members.
- Radiation surveys must be conducted prior to initial activity in a radiation area and whenever conditions change to evaluate and insure compliance with this policy. When appropriate, such an evaluation will include a physical survey of the location of materials and equipment, and measurements of levels of radiation or concentrations of radioactive material present
- An effective ALARA program will help with minimizing team member exposure by implementing engineering and administrative controls. The three main principles of an effective ALARA program include;
 - Minimizing the time of exposure which directly reduces radiation dose.
 - Doubling the distance between a team member's body and the radiation source. This will divide the radiation exposure by a factor of 4.
 - Using absorber materials (shielding) such as Plexiglas for beta particles and lead for x-rays and gamma rays to reduce radiation exposures.

7.2.2 Personal Monitoring

- Cianbro must supply appropriate personnel monitoring equipment, such as film badges, pocket chambers, pocket dosimeters, or film rings, and shall require the use of such equipment by:
 - Each team member who enters a restricted area who could receive, or is likely to receive, a dose in any calendar quarter in excess of 25 percent of the applicable value specified in Table 1 above
 - Each team member under 18 years of age who enters a restricted area who could receive, or is likely to receive, a dose in any calendar quarter in excess of 5 percent of the applicable value specified in Table 1 above
 - Each team member who enters a high radiation area

7.3 Signs and Barricades

- Each radiation area shall be conspicuously posted with signage or barricades bearing the radiation caution symbol and the words:

CAUTION
RADIATION AREA



Example

- Each high radiation area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION
HIGH RADIATION AREA



Example

- Team members must be trained to recognize radiation signage and barricades and to avoid radiation areas unless specifically authorized to enter them. Any team member who enters a radiation area without authorization will be subject to disciplinary action per the 039 Zero Tolerance - Safety Accountability Policy and Procedure.

7.4 Emergency Signals

7.4.1 Depending on site conditions and the level of potential radiation exposure during an unexpected release, an immediate evacuation warning signal may need to be in place to notify affected team members of an emergency situation. When warranted, the signal has some very specific requirements that include;

- The signal generator must have a frequency between 450 and 500 hertz (Hz) and not be less than 75 decibels at every location where a team member may be present whose immediate, rapid, and complete evacuation is essential.

- A sufficient number of signal units must be installed such that the requirements above are met at every location where a team member may be present whose immediate, rapid, and complete evacuation is essential.
- The signal shall be unique in the plant or facility in which it is installed
- The minimum duration of the signal shall be sufficient to insure that all affected team members hear the signal.
- The signal-generating system shall respond automatically to an initiating event without requiring any human action to sound the signal.
- Once the system has been placed in service, periodic tests, inspections, and checks must be made to minimize the possibility of malfunction.

7.4.2 All team members whose work may necessitate their presence in an area covered by the signal must be made familiar with the actual sound of the signal-preferably as it sounds at their work location. Prior to placing the system into operation, all team members normally working in the area must demonstrate that they can identify the signal by actual demonstration at their work locations.

7.5 Training and Posting Requirements

7.5.1 Training Requirements

- Appropriate training must be conducted for all team members who have the potential for exposure to Ionizing Radiation. The level of training will be determined by the type and expected dose. Team members who work in Nuclear Facilities will be trained in accordance with Nuclear Regulatory Commission (NRC) Standards. Team members in states with specific laws and regulations will be trained accordingly. All other team members will be trained to these minimum requirements:
 - Team members working in, or frequenting, any portion of a radiation area shall be informed of the presence of radioactive materials or radiation and its location in the radiation area
 - Team members shall be instructed in the safety problems associated with exposure to such materials or radiation and in precautions or devices intended to minimize exposure (ALARA)
 - Team members shall be instructed in the applicable provisions of this policy in regards to their protection from exposure to radiation or radioactive materials
 - Team members shall be advised of any current reports pertaining to their radiation exposure
- Other specific training topics that should be covered, where applicable, include:
 - Characteristics of x-rays
 - Units of radiation dose
 - Personnel monitoring and the use of personnel monitoring equipment
 - Symptoms of acute localized exposure
 - Proper procedures for reporting an actual or suspected overexposure
 - Identification of radiation hazards associated with the use of x-ray equipment
 - Significance of radiation warnings and safety devices incorporated into x-ray equipment and their function relative to safe operation.
 - Proper operation procedures of the x-ray equipment
 - Applicable State and Local Regulations
 - Emergency procedures

7.5.2 Posting Requirements

- A current copy of this policy and its provisions is available in the Standard Operating Procedures - SOP and available for examination by team members upon request.

7.6 Notification of Incidents

The Manager of Environmental Hazards must be informed of certain levels of team member radiation overexposure so that the appropriate regulatory agency can be notified depending on NRC and/or State requirements. There are two requirements for notification based on the level of team member exposure.

- 7.6.1 Immediate notification is required following any incident involving radiation which may have caused or threatens to cause:
- Exposure of the whole body of any individual to 25 rems or more of radiation.
 - Exposure of the skin of the whole body of any individual to 150 rems or more of radiation.
 - Exposure of the feet, ankles, hands, or forearms of any individual to 375 rems or more of radiation.
 - The release of radioactive material in concentrations which, if averaged over a period of 24 hours, would exceed 5,000 times the established specified limit for that material.

- 7.6.2 Twenty-four hour notification is required following any incident involving radiation which may have caused or threatens to cause:
- Exposure of the whole body of any individual to 5 rems or more of radiation.
 - Exposure of the skin of the whole body of any individual to 30 rems or more of radiation.
 - Exposure of the feet, ankles, hands, or forearms to 75 rems or more of radiation.

7.7 Reports of Overexposure and Excessive Levels and Concentrations

- 7.7.1 In addition to any notification required above, a written report must be generated within 30 days of any team member exposures to radiation or to concentrations of radioactive material in excess of any applicable limit in this policy. The report must document;
- A description of the extent of exposure of team member(s) to radiation or to radioactive materials.
 - The levels of radiation and concentration of radioactive material involved
 - The cause of the exposure.
 - Corrective measures taken or planned to assure against a recurrence.

- 7.7.2 Any time a report is generated because of team member overexposure to radiation or to concentrations of radioactive material, the team member must be notified of the nature and extent of the exposure. Such notice must be in writing and must contain the following statement: "You should preserve this report for future reference."

7.8 Recordkeeping and Disclosure of Records

- 7.8.1 Records of any team member's radiation exposure for which personnel monitoring are required must be maintained and they must be advised of their individual exposure on at least an annual basis.

- 7.8.2 At the request of a former team member, a report must be provided documenting the team member's exposure to radiation. The report must be furnished within 30 days of the time the request is made and shall cover each calendar quarter of the team member's employment involving exposure to radiation unless a lesser period of time is requested. The report must also include the results of any calculations and analysis of radioactive material deposited in the body of the team member. The report must be in writing and contain the following statement: "You should preserve this report for future reference."

7.9 Safety At Home – Radon Gas

- 7.9.1 Radon gas cannot be seen, smelled, or tasted and is responsible for the majority of public exposure to ionizing radiation. Radon is usually found in soil, but it is present everywhere. The ground that we all walk and build our homes upon contains varying levels of naturally occurring radioactive elements. These elements decay into radon gas which can then seep into homes and become a health concern. Radon gas from natural sources can accumulate in buildings, especially in confined areas such as attics, and basements. It can also be found in some spring waters and hot springs. According to the United States Environmental Protection Agency, radon is the second most frequent cause of lung cancer, after cigarette smoking, causing 21,000 lung cancer deaths per year in the United States. To learn what you can do to protect yourself and your family from radon, please see www.epa.gov/radon.

8 Budget / Approval Process

- 8.1 All necessary materials required to meet the requirements of this policy are the responsibility of the jobsite.

9 Related Documents

- 9.1 Not applicable

Policy Number: 049**Authorized By:** Michael W. Bennett**Title:** Grinder Use and Operations Program**Effective Date:** 12/01/08Page 1 of 11

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To provide guidelines for using grinders safely on all Cianbro sites.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Angle Grinders:** Are good choices for bigger work pieces too large or heavy to work at a bench. Angle grinders are a hand held portable tool with wheels from 4 to 9 inches. **4, 5, and 6 inch** grinders are suited for grinding, cutting and finishing on concrete, masonry, and base metals. **7, 8, and 9 inch** angle grinders are more suited for large areas, weld finishing, and dressing torch cut steel.
- 4.2 **Anti Kick Back Angle Grinders:** Made by several different manufacturers features an electronic control that detects rapid RPM decrease and shuts off the power, as when the wheel binds in material, lessening the possibility of the tool kicking out and back towards the user. This type of tool may be the best choice when cutting is necessary with .045(or similar) cut off wheels.
- 4.3 **Bench Grinders:** Stationary tool mounted to a bench, table, or stand. Available from 6 inch wheel or larger (8 inch is most common). Ideal for sharpening hand tools and blades. Good for shaping, smoothing, or polishing hand held parts. Often equipped with one wire wheel for rust removal or polishing, and one abrasive wheel for grinding/sharpening.
- 4.4 **Die Grinder (or pencil grinder):** Is a specialty hand held power tool designed to shape and polish the inside of cylindrical objects and hard to reach areas. With long thin spindle and shaft they can reach deep inside a work piece. Mostly to be used for deburring, machining, metalworking and piping applications. Die grinders can be used with many different shape and size accessories and grinding tips. Most manufacturers do not allow a cut off wheel to be used with this type of grinder.
- 4.5 **Dynaflex Grinder:** Is an abrasive belt grinder/sander, ideal for grinding, deburring, blending, finishing and surface conditioning of small, precision, or hard to reach areas. Used with grinding belts from ¼ inch to ¾ inch wide and 18 inches long. Good for metal, plastic, composites, and when precise control is needed.
- 4.6 **Shrouded and Wet Method Grinders:** Should be used when grinding concrete. To smooth form work marks, or remove paint and glue. Most shrouded concrete grinders come with an attached dust vacuum. Some are available with a water hose hook up for wet method of dust control.

- 4.7 Tuck Point Grinders: To be used for removing worn, weathered, or loose mortar from masonry joints, as in repointing brick or block structures. Diamond blades are used and typically will include vacuum dust collection or attachment for water hose as dust suppressant.
- 4.8 Tungsten Grinders: are specially designed for sharpening tungsten welding electrodes. Available through the Cianbro small tool department, they are able to grind precise angles while reducing the risk to hands, eyes and lungs.

5 Policy

- 5.1 The use of grinders shall be minimized. Grinders shall be used with all handles and guards in place with one hand on the trigger and one hand on the handle. The use of cut off wheels requires a JHA and approval by a superintendent.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible approving deviations from this policy excluding those specifically spelled out below.
- 6.2 The top Cianbro manager of the job site is responsible for the implementation of this policy on the job site.
- 6.3 Superintendents are responsible for approval of the use of cut off wheels and for approving deviations from the handle and guard requirement.
- 6.4 Corporate Safety is responsible for maintaining this document.

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7.1 Activity Planning

(See form SD1029 for the Grinder Use Planning Checklist) Cianbro believes the best way to protect its team members is to **plan** the activities **today** so that alternative safer methods can be identified and if grinders are required that they are used properly to reduce the risk to team members.

7.1.1 Eliminate the hazard if possible. Make sure we look at alternatives to grinding.
How can we not have to grind?

- Buy material already cut or beveled
- Use different tool to make cuts

7.1.2 Identify the type and size of grinder and appropriate wheel in the activity plan

7.1.3 Grinding hazards to address:

- Cuts from grinding wheel (proper hand and finger protection).
- Wheel binding up causing kickback.
- Wheel still spinning when move away from work piece.
- Foreign body in eyes from particles given off during grinding.
- Wheels shattering causing flying particles.
- Soft tissue injuries due to vibration, gripping of the grinder, and body position.
- Respiratory hazard from materials in particles given off (e.g. lead): Avoid inhalation of dust generated by grinding and cutting operations. Exposure to dust may cause respiratory ailments as well as irritation to eyes and skin. In most cases, the greater hazard is the exposure to the dust/fumes from the base material being ground or paint or coatings applied to it. Refer to the MSDS before using the grinding wheel.
- Combustible materials in the work environment.
- Long hair and dangling objects such as jewelry.
- Long sleeves, loose clothing, and strings from hooded sweat shirts, and rain gear.
- Before energizing the grinder determine the position you will hold the tool to perform the work, ensure proper guard and handle adjustment.

7.1.4 Clearly identify how to access the work. Plan to keep work in front of team member between knees and shoulders.

7.1.5 Ensure team members have been trained for the specific tool they are going to use.

7.2 Right Tool for the Job

7.2.1 Ensure the correct type of grinding wheel is used for the work that is to be done. Refer to the manufacturer's literature for appropriate use of the different grinding wheels.

7.2.2 Available technology:

- Grinders with brakes on them.

- Anti-kickback grinders - *Cianbro requires electric grinders to have this feature.* All new grinders purchased must have this feature. Existing grinders will be phased out as they wear out.
- Special guards for using cut-off wheels on grinders.
- Air tools – These are less likely to kickback and because they are smaller than electric grinders they are more ergonomically friendly.
- Ergonomic friendly grinders. Grinders with smaller grips, with triggers that take less force to keep depressed, triggers that can be repositioned so that different fingers can be used to squeeze, etc.
- Track grinders – grinders that move on a track set up like track torches.

7.2.3 Alternatives to grinder use

Alternatives to consider:

A. Structural

- Cut off saws
- Metal cutting circular saw
- Band saw
- Portable band saw
- Track torch
- Track plasma torch
- Track grinder
- Nibblers
- Shears
- Die grinder

B. Pipe

- Electric/Pneumatic Beveling/Cutting Tools (Portable machining tools to replace abrasive grinding).
- Mill hog
- “Prepzilla”
- Clam shell
- Track torch
- Metal cutting circular saw (good for pipe in stands that can be rolled).
- Circular saw w/ blue blade (good for pipe in stands that can be rolled).
- Band saw
- Portable band saw
- Cut off saw

C. Concrete

- Diamond bit grinding wheel
- Cut off saw

D. Paint

- Needle gun scaler
- Flapper wheel grinder
- Grinder w/ hepa vac
- Grit blasting
- Rotopeen
- Scabblor

7.3 Training

7.3.1 Ensure each team member has had training to include general grinder safety (use this Safety Policy and Procedure) and hands on for each type of grinder to be used.

7.3.2 Send training records to the Cianbro Training Institute; scan and email them to TrainingAttendance@cianbro.com.

7.4 Tool Inspection

7.4.1 Inspect the cord and pneumatic fitting

- 7.4.2 All guards in place
- 7.4.3 Handles in place
- 7.4.4 Body/housing in good condition
- 7.4.5 Wheel rpm matches grinder rpm
- 7.4.6 Grinding wheel is in good condition
- 7.4.7 Dead man switch is working

7.5 Tool Care

- 7.5.1 Changing discs
 - *Unplug the tool to ensure zero energy.*
 - Replace the worn disc with the correct new disc. Ask your supervisor for help if unsure.
- 7.5.2 Proper storage of grinders and discs to prevent damage: Make sure grinders are stored to prevent damage from being dropped. Grinding discs need to be stored out of the weather. Make sure discs do not have materials piled on top of them that could cause damage. If a disc is dropped whether on the grinder or not, do not use that disc.

7.6 Tool Use

- 7.6.1 Ergonomics
 - Make sure to take frequent breaks. Specify the length of breaks and how often in the activity plan.
 - Rotate workers if you need long periods of grinding during a shift. Make sure that the job rotated into uses different muscles and vibration is not an issue.
 - Not all team members can handle the bigger grinders.
 - Bring the work to you if possible
 - Look for ergonomic friendly tools
 - Less weight
 - Less vibration
 - Easier to grip (reduced force triggers, triggers that are positionable, smaller diameter handles).
 - Air tools are lighter than the equivalent electric grinders.
- 7.6.2 Body positioning
 - Make sure you can handle the grinder for the job that needs to be done.
 - Use knee protection whenever you have to kneel.
 - Work at a comfortable position, ideally directly in front of you between knees and shoulders.
 - Make sure you have firm footing and solid grip on the grinder.
 - Make sure sparks are directed away from other team members and from flammables and combustibles.
 - Keep two hands on the grinder (one on the trigger and one on the handle) at all times positioned at 6 and 9 o'clock for an angle grinder.
 - Avoid loose clothing that could get caught between the wheel and guard.
- 7.6.3 Work area set up
 - Provide good lighting.
 - Good working surface (level ground, use scaffolds rather than ladders as working surface).
 - Use barriers and guards to protect other workers (welding screens).
- 7.6.4 Grinders must be used with guards in place and both hands on the grinder. *If the grinder is designed with two handles then both handles must be used. One hand is*

required to be on the body and trigger and the other hand has to be on the second handle. Any deviation from this policy has to be approved by a superintendent level person. The reason for deviation from the policy, why this is the safest method, and what additional steps will be taken to ensure the safety of team members while deviating will be included in the activity plan and signed off on by the superintendent. Failure to meet this requirement will result in disciplinary action.

7.6.5 Tricks of the trade

- Allow the grinder to come up to full speed before applying to the task.
- Don't force the disc against the surface; let the grinding disc do the work.
- Keep grinding disc at a 15 to 30 degree angle to the work, unless disc manufacturers specify otherwise then follow their specifications.
- Do not set grinder down until disc has stopped turning. Use the work piece to stop the wheel more quickly after releasing trigger.
- Use outer edge of the disc (but not the side of the disc), working it away from your body.
- Don't use portable grinders as bench grinders by securing the grinder in a vise or similar. Instead, secure your work in a vise.
- Recognize pinch points where the grinder disc could bind.
- When using a cut off wheel (in an approved task), remember to cut the piece so that it does not pinch in towards and bind the wheel. In the case of pipe, start at the bottom and end up on top. By finishing at the top rather than the bottom, the weight of the piece won't cause it to bind against the wheel.
- Inspect the disc as you work to ensure it does not need to be changed due to damage or wear.
- Position guard to direct sparks away from you based on your body position.
- Keep the slag and dust cleaned up in the work area.
- Mount disc on the grinder in the manner described by the manufacturer with the appropriate hardware (flanges, nuts, and blotters).
- Be careful not to over tighten the spindle nut. Too much pressure will deform the flange and put stress on the wheel.
- Gloves and long sleeves should be tight fitting, as loose clothing actually poses a greater threat; it can catch in the wheel and pull the operators hand into the wheel.
- When using a tungsten grinder, a tungsten holder should be used to hold and secure the tungsten.

7.7 Environment

7.7.1 Seek alternative tools and/or practices to eliminate, control, or reduce the environmental impact.

7.7.2 Provide adequate ventilation

7.7.3 Air monitoring – monitor for the following depending on the activity and the MSDS. Involve the safety specialist in determining if sampling is needed.

- Heavy metals
- Silica
- Refer to MSDS for grinding wheels and for the material being ground.
- Other possible contaminants depending on coatings on the material to be ground.

7.8 Using Grinders as Cut-Off Tools

7.8.1 Cianbro policy

- Limit the access. Cut off wheels must be controlled and issued by a superintendent level manager.
- The activity plan has to specifically address the use of cut off wheels, why it is the right tool and how to use it safely.
- Angle grinders used with cut off wheels must have an anti kickback feature unless it is an air grinder. They must be used with guards designed for use with cut off wheels.

- If die grinders are used, ensure the manufacturer actually allows them to be used with a cut off wheel and do not exceed the manufacturer recommended cut off wheel diameter or rpm.
- Most manufacturers make specific “cut-off tools” designed for use with cut off wheels and have appropriate guards.
- Refer to 9.3 Appendix C Mounting Cut-off Wheels on a Portable Angle Grinders

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 See attachments.

9.2 Documents available on Cianbro.net/Resources/Forms

Grinder Use Planning Checklist	SD1029
Checklist for Abrasive Wheel Equipment Grinders	SD1021

Grinders vs. RPM

Cianbro Grinder Matrix		
Type/Make	Model	RPM
Electric		
DEWALT 5" R/Angle	DW831	10,000
Makita 5" R/Angle	GA5010Z	11,000
Makita 7" R/Angle	GA7031Y	8,500
Makita 9" R/Angle	GA9031Y	6,600
DEWALT 1 1/2" Die	DW887	25,000
DEWALT 2" Die	DW888	19,000
Milwaukee 2" Die	5194	21,000
Black & Decker 5" Straight	4271	4,750
Black & Decker 6" Straight	4278	4,000
DEWALT 6" Straight	DW882	5,700
Milwaukee 6" Straight	5243	6,000
Air		
Ingersoll-Rand 5" R/Angle	G2A120RP105	12,000
Ingersoll-Rand 5" R/A Extended	G2L120RP105	12,000
Ingersoll-Rand 7" R/Angle	77A60P107	6,000
Ingersoll-Rand 2" Die	G1H200RG4	20,000

Grinding Wheel Safety

DO:

1. Always handle and store wheels in a careful manner.
2. Always visually inspect all wheels before mounting for possible damage in transit. Resinoid can only be checked visually for possible damage.
3. Always check maximum operating speed established for wheel against machine speed.
4. Always check flanges for equal and correct diameter.
5. Always use a machine guard covering at least one-half of the grinding wheel.
6. Always allow newly mounted wheels to run at operating speed, with guard in place for at least one minute before grinding.”
7. Always wear approved double eye protection when grinding.

DON'T:

1. Don't use a wheel that has been dropped. The impact may result in breakage
2. Don't force a wheel onto the machine or alter the size of the arbor hole. Don't use a wheel that fits the arbor too loosely. If the wheel doesn't fit the machine, get one that fits correctly.
3. Don't exceed maximum operating speed established for the wheel.
4. Don't use mounting flanges which are warped, nicked, sprung, or which are not clean.
5. Don't tighten the mounting nut excessively. On multiple screw mountings, 15-foot pounds per screw are usually enough.
6. Don't grind on the edge of the wheel unless the wheel is specifically designed for that purpose.
7. Don't start the machine unless all guards are in place.
8. Don't stand directly in front of a grinding wheel when a grinder is started.
9. Don't grind material for which the wheel is not designed.
10. Don't use relieved or recessed flanges with threaded hole cup wheels, cones or plugs.

Cut-Off wheel Safety and Cutting Procedures

1. Cut-off wheels should never be stored on edges. Instead they should be laid on solid flat surfaces away from excessive heat and moisture to avoid warping.
2. Machines must have adequate power transmission and capacity, spindle speeds and proper guarding of the wheel. It is best to have extra power to insure good cutting efficiency.
3. Check the speed of the machine spindle against the maximum speed specified for the wheel by the manufacturer. The maximum specified speed for the wheel should never be exceeded.
4. Flanges should be clean, straight and of equal diameter so the wheel will run true. For diameters above 10” it is recommended that the flange be at least 1/3 the diameter of the wheel.
5. The bore size of the wheel is so constructed that the wheel should fit freely on the machine spindle without any slack. Never attempt to force a wheel on the spindle!
6. Always use blotter, when supplied with the wheels.
7. Be sure that the flanges are tightened securely but not too tightly to avoid springing the flanges and changing the pressure area.
8. Be sure the work piece is securely held down, including both side of the cut, if practical. Cut-off wheels withstand a great deal of radial stress but not side stress. Even reinforced wheels are not completely unbreakable. Side pressure must be avoided to insure straight and avoid possible wheel breakage.
9. The wheel must be brought into contact with the work piece without “bumping” or impact. The wheel should cut freely without forcing and the speed of the wheel should be reduced by the cutting operation.
10. Abrasive cutting generates a great deal of localized heat which causes rapid expansion speeds significantly below efficient speed and wheels fed through the cut too slowly will generate excessive heat. Result: Rapid wheel wear, fraying around edge of reinforced wheels, and wheel breakage.”

Reference

Pferdus.com. PFERD INC., 2008. <http://www.pferdusa.com/info/lookups.html><http://www.pferdusa.com/info/lookups.html>> (15 October 2008). Offers a wide variety of quality abrasives and cutting tools.

Mounting Cut-Off Wheels on Portable Angle Grinders

Our records indicate that portable angle grinders have a history that dates back to at least the 1930's for use with cup wheels and coated abrasive discs. In the early 1950's these machines were adapted to be used with a new form of abrasive wheel called Type 27 raised hub, or a depressed center wheel. The newest products to be adapted for use on these machines (mid 1990's) are reinforced cut-off wheels. Each one of these angle grinder accessories has their own special mounting, speed, guarding, and use requirements. The safety requirements for the newest product to be introduced to the angle grinder, cut-off wheels, are important to know and to follow.

Mounting and Using Cut-off Wheels on Portable Angle Grinders

Cut-off wheels are designed for many different types of machines such as chop saws, circular saws, walk-behind saws, gas saws, angle grinders, etc. When selecting cut-off wheels for use on angle grinders, select cut-off wheels that are designed and marked for portable angle grinders. These wheels will often contain an icon showing an angle grinder. See an example of a cut-off wheel designed for an angle grinder.



Since angle grinders can be designed to be used with many different types of abrasive products, select a machine and guard designed to be used with cut-off wheels. The correct machine will have a speed at or below the wheel's maximum operating speed, it will have matching relieved flanges, and a proper wheel guard. The wheel guard must cover 180° and be adjusted so that it is positioned between the operator and the grinding wheel. See examples of wheel guards.



CORRECT - ANGLE GRINDER WITH PROPER CUT-OFF GUARD



CORRECT - ANOTHER TYPE OF ANGLE GRINDER WITH PROPER CUT-OFF GUARD

continued

**PLAY IT
SAFE
AT THE
WHEEL**



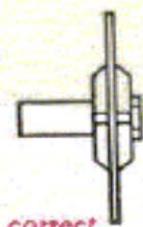
SAINT-GOBAIN
ABRASIVES

Mounting Cut-Off Wheels on Portable Angle Grinders

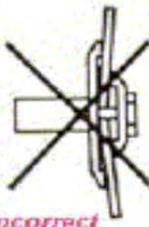
When mounting a cut-off wheel onto an angle grinder, follow the cut-off wheel and machine manufacturer's instructions. Use relieved and matched flanges designed for cut-off wheels. Do not use adaptor flanges (nut and large back flange) designed for Type 27 wheels when mounting cut-off wheels or any other mounting system not designed specifically for cut-off wheels. Improper flanging may push the center out of the cut-off wheel causing it to break.



INCORRECT GUARD FOR CUT-OFF WHEELS



USE FLANGES
EQUAL IN
DIAMETER



DO NOT USE
FLANGES
UNEQUAL IN
DIAMETER

When using a cut-off wheel on an angle grinder, hold the machine steady using both hands. Do not twist the wheel, jam it, pinch it, grind on the side of it, or apply heavy side pressure to it as these actions may cause the wheel to break.



CORRECT – CUT-OFF WHEEL BEING USED PROPERLY

When using cut-off wheels or any other abrasive products, always wear proper personal protection equipment such as eye protection, face shield, and gloves, etc.

Accidents with cut-off wheels can be avoided. Take the time and do it right!

For additional information on this topic or any other grinding wheel safety information, please review ANSI, OSHA and literature provided by the grinding wheel and machine manufacturer. You may also contact the Saint-Gobain Product Safety Department at Tel. (508) 795-2317 or Fax. (508) 795-5120 or contact your Stone Boss representative with any safety related questions.

Source:

Roger Cloutier
Senior Product Safety Engineer
Saint-Gobain Abrasives, Inc.
Worcester, Massachusetts
COATED ABRASIVE STORAGE AND SAFETY!

**PLAY IT
SAFE
AT THE
WHEEL**



Policy Number: 050**Authorized By:** Michael W. Bennett**Title:** Electrical Operations Program**Effective Date:** 09/14/09Page 1 of 22

1 Status

- 1.1 Update of existing policy, effective 09/04/14.

2 Purpose

- 2.1 To maintain consistency within our electrical group by providing guidance on specific procedures and required training necessary to continually improve the safety and quality of our work.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Hi Pot: Electrical testing equipment which uses a high potential (voltage) to determine the ability of conductors or circuit parts to safely carry the rated voltage.
- 4.2 Live Work: Work which is performed on electrically energized circuit conductors or parts.
- 4.3 NEC: National Electrical Code (NFPA 70)
- 4.4 NFPA 70E: Standard for Electrical Safety in the Workplace.
- 4.5 Substations: Specifically relating to Transmission and Distribution Substation areas.
- 4.6 Temporary Power: (Per NEC Section 590.3) Temporary electric power and lighting installations shall be permitted during the period of construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities.

5 Policy

- 5.1 Cianbro will meet applicable OSHA standards, the NEC and NFPA 70E requirements when temporary electrical equipment and systems are installed and maintained, or when any temporary or permanent energized circuit work occurs.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Pre-Planning

7.1.1 Assignment of Personnel

Each job is different and each electrician has different skills. It is necessary to match the two as well as possible. To do this, it is important that the job site manager, the staffer and the electrical advisory committee work together to identify the correct workers with the necessary skills to perform energized work.

A. Regional / Corporate Electrical Advisory Committee:

1. Committee Goal:

To advise Regional and Corporate management on specific needs which will promote the continued development of a professional electrical team within Cianbro Corporation, in order to remain current with industry standards and requirements.

2. Committee Make-up:

- Electrical supervisors of projects from their respective areas, reflecting a true representation of the types of jobs/clients
- At least one representative of the Cianbro Institute
- One Facilitator to maintain alignment with the tasks at hand
- At least one representative of the Cianbro Corporate Safety Department

3. Committee Responsibilities:

- To set up, manage, and monitor a system that assigns our electrical team members with a rating based upon their experience and competencies in various specific electrical skill and knowledge areas. This rating system would be used by staffers and managers to help insure that electrical personnel are assigned to responsibilities for which they are qualified, based upon the level of exposure to different voltage hazards, and experience with specific tasks.
- To constantly review and refine our "**ELECTRICAL SAFETY PROGRAM**" and guide our operations through needed upgrades due to changes of regulations, new technology or changes in the work environment, by the development of appropriate procedures.
- To be a resource for corporate safety as they develop new policies which will meet or exceed OSHA standards.
- To support Cianbro Institute in the development of specific training, this will allow team members to increase their competencies. Also to work with the Institute to develop the means by which new team members can be evaluated and rated.
- To educate supervisors and managers regarding requirements for staffing, supervising, and subcontracting electrical work.
- Standardize procedures and equipment used by the electrical group.
- Advise equipment group on accepted equipment and tools.

7.1.2 Electrical Certification Levels for Energized Work

A. Level 1

Qualifies workers to work on or around following voltages as long as all policies are followed, proper PPE is used and required permits have been obtained:

1. 50v-600v

General requirements:

- a. Has completed training to include:
 - Basic electrical safety
 - Arc flash / blast protection- NFPA 70E
 - CPR
 - Use of test equipment including a megohmmeter
- b. Is licensed if in a state where electricians are licensed, and if no license required, has completed education/experience requirements below:
 - Completion of an apprenticeship program
 - Completion of two year associate degree program in electrical technology plus one year of related experience
 - Completion of ABC or IEC or equivalent program plus job experience
- c. Has been recommended and approved by the regional Electrical advisory committee.

B. Level 2

Qualifies workers to work on or around following voltages as long as all policies are followed, proper PPE is used and required permits have been obtained:

1. Up to 13.8 kilovolts

General requirements:

- a. Has completed Level 1 General requirements and additional training to include;
 - Protective grounding
 - Proper use of Hi potential testers (Hi-pot)
 - High voltage terminations/splicing
 - Proper use of hot sticks
- b. Has been recommended and approved by the regional Electrical advisory committee.

C. Competency ratings for each level are:

- A - Competent to supervise work
- B - Competent to perform work (stand-alone)
- C - Gaining experience (entry level)
- D - Training required (to achieve entry level)

D. When working on or near Substations or Switchyards with exposure to Transmission/Distribution voltage levels, refer to Cianbro Safety Policy and Procedure 051- Electrical Substations.

7.2 Training and Testing

7.2.1 In addition to the training listed below, all team members need not only be trained, but competent in any procedure or activity specific to the work they are going to perform on our jobsites.

7.2.2 All training must be documented on the Cianbro Training Attendance Sheet (PD621) available on Cianbro.net and sent to the appropriate training coordinator to be tracked in our system.

A. Required training by electrical level.

Refer to section 7.1.1 of this document.

B. Required training for non-electricians

Follow the training requirements in the Electrical Safety and Arc Flash Protection Policy and Procedure and the Zero Energy State Safety Policy and Procedure.

7.3 Procedures

- 7.3.1 Electrical Safety and Arc Flash Protection Policy and Procedure (020).
This safety policy and procedure provides guidance for all team members in regard to electrical hazards on our jobsites. This safety policy and procedure is available on Cianbro.net.
- 7.3.2 Zero Energy State Safety Policy and Procedure (016).
This safety policy and procedure provides guidance for all team members for working around equipment with any type of energy present. This safety policy and procedure is available on Cianbro.net.
- 7.3.3 Arc Flash Protection Policy
See Cianbro Electrical Safety and Arc Flash Protection Policy and Procedure 020.
- 7.3.4 Standard Operating Procedures
- A. Protective Grounding
(protective grounds are designed to protect the electrical worker from any voltage sources which could be introduced into the system which the worker cannot control and should not be confused with system grounding).
1. Before any grounds are applied verify that all power sources are de-energized and locked/tagged out.
 2. Use proper ground apparatus (clusters) designed for the application.
 3. Inspect to insure that apparatus is clean and in good working order.
 4. Protective grounds are typically installed upstream and downstream of the work.
 5. Shock and arc hazard PPE must be worn according to Cianbro's policies and NFPA 70E.
 6. When task is complete and before lockout is removed grounds must be removed.
- B. Hi-Pot
1. DC & AC electrical Hi-pot test procedure
 - a. Always take care uncrating & inspecting the hi-pot when receiving the equipment on site.
 - b. When inspecting, insure there is no damage to the equipment including dents or other evidence that the equipment was dropped or crushed. Insure there are no cracks in the meter faces, or any defects in the high voltage or control cables. Insure there is no oil leaking from the transformer.
 - c. Review the owner's manual prior to use. If no owners manual is included or can be obtained, consult with a qualified and experienced operator of the equipment to insure that set up and operation is communicated.
 - d. Equipment must be stored in a warm dry location at least one day before use.
 - e. When ready to use the Hi-pot do another inspection before set up. After inspection; wipe the equipment down to prevent any tracking of the high voltage to ground. All the cable should also be wiped down with cable clean especially the high voltage cable to the transformer.
 - f. Identify the shock protection boundaries at either end of test site with red barricade (Danger) tape to create a controlled access zone.
 - g. Before assembling the Hi-pot remove the safety interlock; this must be kept in the operator's pocket.
 - h. When setting up the equipment place the transformer within reach of the cables being tested. Then set the control panel as far away from the transformer as the control cable will allow. This will keep the operator away from the test connections, and outside the shock hazard boundary.
 - i. Before proceeding, check to insure that all the proper grounds are in place. Most equipment will come with these ground wires: if they are not provided they may be made with #10 AWG THHN or larger. **Do not operate the equipment without the grounds installed.** Install a ground from the control panel to the transformer, from the transformer to the equipment ground, and to all of the shielding of the cable being tested. Also ground

the conductors that are not being connected to the high voltage cable. These grounds will have to be changed as the test is being done so keep this in mind when choosing wiring methods.

- j. After double checking grounds attach the high voltage cable to the conductor being tested. Some unit's have a clamp on connection and some of them have a bolt on type. With either mechanism insure you have a good connection.
- k. Become familiar with the function of the control panel. Turn all controls to the lowest settings.
- l. After all scales are set at their lowest settings plug the unit into the power source. At this point the safety interlock can be removed from the operators pocket and plugged in.
- m. With the safety interlock plugged in, the Hi-pot unit may be turned on; it may take a second or two before a high voltage indicator light will illuminate, wait for the light before proceeding. **If applicable, insure that the metering damper is on.** Slowly start turning up the voltage until the first voltage plateau is reached. This will be held for a desired time usually 1 minute. **If applicable, take metering out of 'dampening'.** Observe the micro amp scale. After specified test time period is finished, record micro amps then proceed to next voltage plateau. Repeat these steps until you reach the desired test voltage. This voltage is usually recorded for a 10 to 15 minute time frame with recordings every minute.
- n. Once the test is complete, turn voltage down slowly until it is at 0 volts. After voltage has reached zero the Hi-pot unit may be turned off.
- o. **Before changing the test leads to next conductor being tested the operator must be protected with the proper shock protection for this step which will include voltage rated gloves in addition to other required PPE.**
- p. After donning proper PPE, ground your tested conductor. After the tested conductor has been grounded it may be disconnected from the test leads and grounded with the other conductors.
 - Repeat the steps until all conductors have been tested
- q. Store test equipment with care, in suitable containers which will protect it from physical damage during shipping.
- r. Keep in mind that there is currently more than one model of Hi-Pot testers in use by our company. Therefore care must be taken to read the instructions pertaining to the unit you are using, as it may instruct you to perform the test differently.

C. Voltage Testing Procedure:

1. Proper Set-Up for voltage testing includes:
 - a. Follow NFPA 70E requirements for PPE selection and special precautions including hazard boundary identification.
 - b. Metering equipment used must meet IEC 1010-1 Category III standards at a minimum.
2. Use of Equipment:
 - a. Before each use of an electrical tester, make sure the battery panel is closed and latched; inspect the tester and test leads for cracks, missing plastic, exposed metal, or damaged insulation; and visually inspect metering equipment to ensure grease/oil/water is not present on any portion of the test leads.
 - b. When handling the probes, keep your fingers behind the finger guards and touch one probe to a conductor, once secure, touch the second probe to the desired conductor. Do not try to simultaneously touch the probes across a conductor. This creates a dangerous situation as it is difficult to accurately control both probes simultaneously.

- c. Perform the voltage check by placing the probes on each phase of the conductors. Then test each phase to ground, each phase to neutral, and neutral to ground to verify zero potential on neutral. A total of 10 checks will be performed from Phase 1 – Phase 2, Phase 1 – Phase 3, Phase 2 – Phase 3, Phase 1- Ground, Phase 2 – Ground, Phase 3 – Ground, Phase 1 – Neutral, Phase 2 – Neutral, Phase 3 – Neutral, Neutral – Ground.
- d. Once again, verify the meter's operation by measuring a known voltage source. The procedure of verifying the operation, performing the voltage check, then re-verifying the operation is referred to as the '3 step voltage testing method' or "live dead live".

D. Phase Rotation Testing Procedure:

1. Proper Set-Up for testing includes:

- a. Follow NFPA 70E requirements for PPE selection and special precautions including hazard boundary identification.
- b. Metering equipment used must meet IEC 1010-1 Category III standards at a minimum.

2. Proper Method:

- a. The proper method of confirming that the phase sequence is correct is to isolate the installation from the supply and carry out continuity testing of the individual conductors from the origin of the installation to each distribution board and from there to the furthest point of each circuit. This testing may need to be carried out in sections.
- b. Once the supply polarity including phase rotation has been confirmed for each section, the power can be restored and the next section tested until the phase sequence has been confirmed throughout the installation. Phase sequence testing can then be carried out at each item of equipment.

3. Use of Equipment:

- a. Before each use of an electrical tester, make sure the battery panel is closed and latched; inspect the tester and test leads for cracks, missing plastic, exposed metal, or damaged insulation; and visually inspect metering equipment to ensure grease/oil/water is not present on any portion of the test leads.
- b. When handling the probes, keep your fingers behind the finger guards and touch one probe to a conductor, once secure, touch the second probe to the desired conductor. Do not try to simultaneously touch the probes across a conductor. This creates a dangerous situation as it is difficult to accurately control both probes simultaneously.
- c. Testing will be used to confirm that phase sequence is correct at each item of equipment using a phase sequence/rotation instrument. The test instrument will give an indication that the phase sequence is correct. By confirming that Brown is connected to phase L1, Black is connected to phase L2 and Grey is connected to phase L3.

4. Steps:

- a. Each item of equipment will be locked out in accordance with our policy.
- b. A voltage test will be performed according to our procedure.
- c. Once zero energy is confirmed, the leads for the phase rotation meter will be installed.
- d. The leads will be attached as follows- L1 (A) to phase one, L2(B) to Phase two, L3(C) to phase three- Position orientation being from left to right or top to bottom, facing the front of the equipment.

- e. Once the leads are firmly attached and the meter is in a place where it will not be harmed by electricity, Cianbro electricians will move out of the Limited Approach Boundary.
- f. Lock out will be then be removed and the equipment will be energized.
- g. The rotation will be verified while wearing the Arc Flash gear required by NFPA 70E.
- h. The item of equipment will then be de-energized and locked out, So that the meter can be removed.
- i. A Voltage Test will be done according to Cianbro voltage testing procedure.
- j. The phase rotation meter will be removed and the equipment returned to service.

E. Temporary Jobsite Power Recommendations

1. Issues for Setting up Temporary Power on Job Sites
 - a. Calculate the total power requirement.
 - Determine what the utility or the client has available for power in the area will help in determining amps and voltage available
 - Determine location and distance of the power cable route
 - Determine which type of cable will be needed
 - Determine what type of physical protection will cables need
 - Check for temporary power materials with the yards before buying
 - b. Have qualified electricians install all temporary power.
 - With temporary power cable runs (especially outside runs), try to minimize the use of cord caps in effort to eliminate the problems with arc blast from water related short circuits. Use complete cable runs as much as possible when installing temporary power.
 - Electrical equipment and material for temp power should have a designated place for storage when not in the field.
 - Projects need to return the equipment and material as they received it.
 - Temp power equipment should be hard wired as much as possible. (This will help eliminate the cord-cap problems we have had over the years.) (Splitter's should be hard wired by an electrician on site to prevent breaking an energized line by unqualified personnel)
 - The temp cables should not be cut unless necessary. This will help our hard wiring effort.
 - The cables should be returned on reels with remaining footage labeled on reel and ends of cable sealed for future use.
 - Equipment should be returned intact and stored in a dry location.
 - All equipment for temporary power should be NEMA 3R rated minimum.
 - All disconnect switches should be fusible.
 - All fuses should be 'one time' unless for motors. These must be time delay.
 - The 480 & 240-volt cords should be kept dry when stored and not exposed to weather.
 - When in use, the cord can be wrapped with plastic 'Stretch' wrap and secured with electrical tape. This has worked well in wet locations.
 - The cord caps shall be appropriately listed for the application.
 - Temporary power equipment should be identified and tracked for availability in order to make it more efficient to set up a project.
 - Setting up new job: Get the lengths of cable you will need to do the job without using cord connectors (especially if outside). Figure out what is needed for disconnects and or power stands.
 - Cable: Lengths of 75' or greater should be on reels; this will make it **easier and safer** for installing temporary power. (The reels should be labeled with the footage on them).
 - When demobilizing a job, take the time to pull back the temporary cords and put them back on reels with the footages labeled on them,

this will make it much easier to return them to stock, keep an inventory and then get back out to the other jobs starting up.

- **No job wants to spend the *money* at the completion of the job to demobilize, but a lot of *money* is spent to set up temporary power and the budgets are rarely big enough. If every job takes the time to salvage its temporary power, we all could share in the benefits.**
- Pallet vs. Reel: For the effort required to coil power cords onto a pallet you can save time by rolling it onto a reel. This will also allow you to dispense it again more easily. Save the reels that the power cord came on, and maybe other reels for the cords that didn't have them.

F. Florescent Light Fixtures

1. Fixture fires

There have been a number of incidents involving florescent light tubes which are protected by plastic tube guards when used with a "lazy Susan" type tube socket. These incidents are caused by high resistance connections which cause excessive heat at the socket ends and the thin plastic of the tube guard may be more prone to melt and ignite.

a. Causes of these poor connections:

- The tube sockets contain a rotating plastic circle and very light duty contacts.
- When turning the tube into the socket it is very difficult to determine that the tube is locked into the fully connected position. Unlike older style florescent lights, T-8 (electronic ballasts) lamps will often fully illuminate even if they are not properly twisted in.
- The plastic tube guard may push the tube away further from the socket creating an even poorer connection.

b. Best Practice:

- Because it is hard to find fixtures with the older type ends, It is very important that extra attention is given to the task of installing lamps.
- It is also very important to keep flammable materials away from these light fixtures.
- In areas where tube guards are not required they should not be used with this type of socket.
- Communicate that this has been a problem so all can be watchful.
- When using plastic guards verify that they are not too long for the tube, trim length in necessary
- Avoid using fixtures with light duty "lazy Susan" terminal ends, use older style ends in which the tube contacts positively click into the socket or cold start fixtures which have spring loaded ends.

G. Splicing

Each person must have documented training in the particular splices they are making.

H. Procedure for Plugging In Cords and Equipment above 125 Volts

Though cords are designed to be plugged and unplugged, significant hazards exist with cords rated higher than 125 volts.

1. Specifically: Arc flash/blast, and shock. This can happen due to:

- a. Moisture/wet condition of equipment, cord, etc.
- b. Faulty equipment/cords due to transportation, misuse, or improper assembly.
- c. Plugging or unplugging equipment at a disconnect switch, splitter, or cord that is energized while the equipment is on or in use under load.
- d. Damage to connections such as being crushed by equipment traffic or caught in a pinch point.
- e. The Electrical Advisory Committee has recommended that we standardize our connecting devices, and that these must be devices listed for the purpose and use in wet locations.
- f. Best practice

Upon initial set up of cords, in addition to damage and continuity checks, the plugs should be opened and inspected for:

- Proper plug configuration.
- Proper conductor termination on correct lugs.
- Proper amount of conductor stripped.
- Evidence of overheating.
- Loose connections.
- Cracked or damaged casing
- Loose strands free from lugs.
- Proper installation of weather tight boots.

The life of these cords, and the safety of our team, depends upon:

- The application and installation methods.
- Proper handling and storage.
- Protection from adverse conditions and physical damage.
- Quality and frequency of inspections.

2. Proper Procedure

- a. Only a qualified person may plug or unplug cords above 125 volts.

A qualified person:

- Has been trained in this specific procedure.
 - Is able to recognize and eliminate hazards associated with this procedure.
 - Has completed a walk down of system components to determine that de-energizing will not create a greater hazard.
 - Has verified those disconnect switches or circuit breakers of equipment being connected or disconnected are in the "OFF" position to assure a 'no-load' condition.
- b. Verify that the source of power will handle the equipment that you want to connect. Ask a competent person (electrician) if you do not know. If not, find another circuit.
- c. If the power source is sufficient, make sure that the power is off and locked out if necessary. **Verify that de-energizing will not create a greater hazard such as disconnecting mag drills, etc.** If you are in total control of the source (disconnect is right in front of you e.g.) then lock out may not be required.
- d. Check that the switches on the equipment which you are connecting are in the 'off' position.
- e. Plug or unplug and make required changes.
- f. Prior to energizing take the time needed to pick up connectors and splitters from the floor, make sure that they are hung up and protected from physical damage as well as moisture. Protect cords that are routed across the floor and are subject to physical damage.

I. Procedure for quarterly Portable GFCI Testing:

- a. Inspect the device prior to connecting to power supply.
- b. Use approved fault load tester with variable range.
- c. Ensure that device trips within acceptable parameters: 4mA-6mA.
- d. Record results and device ID# in log.
- e. Identify device as having been tested for the quarter with proper colored electrical tape wrapped around cord at male plug end.

J. Procedure for Electrical Cable Installation

1. For all cable pulling activities, the following is required:
 - a. Each cable-pull must be evaluated separately.
 - b. Determine what type of cable is to be installed.
 - c. Determine the difficulty of the pull.
 - d. Determine if the cable pull will be done manually or by mechanical means.
 - e. Mechanical means should always be considered first.

- f. If it is not feasible to use mechanical means and the pull is going to be done manually, you must determine the position of all cable pullers, and the number of team members required.
 - g. Determine whether the location of a cable pull will require mechanical means to assure a productive safe installation.
 - h. Be sure that people have access to their work locations and an adequate work platform.
 - i. Identify adequate tie off points and provide them if necessary.
 - j. Consider body position and ergonomics in relation to the pull for each team member.
 - k. If mechanical means will be used to install the cable, the set up, personnel, and accessibility all have to be determined.
2. Proper activity planning must be done. Here are some questions and tips to consider:
- a. How are we going to get the people into position?
 - b. What do we need to do in order to make the pull ergonomically correct?
 - c. After you begin the pull, stop periodically and talk to the crew to determine if the pull is going well or if we need to make adjustments. Some adjustments may include a different work platform, more personnel, mechanical assistance (cable-tugger), or sheaves/rollers, to help eliminate extra drag.
 - d. Can we get people in all the positions needed?
 - e. Will we need to add a clothesline pulley system?
 - f. When manually pulling cable, good communication between the cable pullers is very important. The ground person assigned to follow the cable should be monitoring this.
3. When pulling cable by mechanical means you still have to consider many of the same issues as when pulling manually. When setting up mechanically assisted cable pulls, these additional things should be considered:
- a. A mechanical cable tugger is capable of exerting tremendous force during the pull. Tuggers must be anchored securely in a manner which will meet the demands of this force and a secondary means of securement, such as an adequately anchored nylon strap, shall be attached to the tugger.
 - b. The tugger will be doing most of the work, but you will need personnel in places to make sure the cable isn't damaged during the pull.
 - c. You must position workers so that they are not in harms way. **EXAMPLE:** Never position your body on the inside of a bend in cable tray. If the pulling equipment fails, you could be struck or pinned by the cable or pull rope.
 - d. **Stay out of the line of fire!**
 - e. You must be sure the personnel observing the pull, have adequate room to stand back from the pull, in case the equipment fails so they won't be struck by components of rigging or equipment.
 - f. When pulling with mechanical means all pulling gear needs to be set. The rope must be routed and a slight tension applied to the pull rope before tugging the cable. Check all alignment and make adjustments where needed.
 - g. Be sure to protect previously installed cables from possible damage during the pull, as these will likely be energized.
 - h. When you start the pull you should take up tension on the cable hold it and recheck alignment. Restart the pull. When the cable begins moving, it should move smoothly, and the tension on the tugger should increase slowly as the load increases. If tension suddenly increases the pull should be stopped and the tension held. The alignment must be rechecked at this point.
 - i. When pulling with a tugger, communication is just as important as pulling cable manually, and radios should be used so that the tugger operator has communication with the observers during the cable pull.

4. Additional tips:

- a. Be sure to have an adequate drinking water supply available to the team, especially if the pull is done manually.
 - b. Have a plan in place for rescue in the event of an injury in an elevated location.
 - c. Carefully consider the physical limitations of individual team members in regard to their placement in the pull line. Especially remember to review any work modifications, as this task can be physically demanding at times.
 - d. If pulling lubricant is to be used, be sure to have plenty of rags available for clean up, and be sure to practice good housekeeping during the pull to avoid slip hazards.
 - e. Consider the need for additional stretching breaks if the pull is strenuous.
- K. Procedure for handling cable tray
1. When receiving materials
 - a. Inspect for damage and quantity.
 - b. Inspection will include identifying damage that would create potential risk when unloading or handling.
 - c. The inspection will include verifying that banding & pallets have not been damaged during shipping to create a hazard unloading or handling.
 2. Transporting materials in yard
 - a. When transporting materials from storage area to work area, the proper equipment will be used.
 - b. When needed, the load will be secured to the equipment during transportation.
 - c. The path of transporting will be verified and areas will be identified where tight quarters exist.
 - d. Always identify other work activities in the area.
 - e. When the materials arrive at the work area, they shall be placed on a secure level area.
 - f. When the shipping bands are removed, they will be cut carefully so that they do not spring free and create a hazard.
 3. Installing horizontal cable tray in modules
 - a. When handling material in the work area, two team members will be used when handling the larger pieces of material such as full lengths of tray, or steel and unistrut for supports. Team members need to have a shared plan for moving the material prior to the work. Good communication will be part of this plan.
 - b. Once any of the materials have been cut, all sharp edges will be filed to remove burrs.
 - c. When lifting pieces of cable tray or support materials into place. The preferred method would be with the aid of hoisting equipment and proper rigging techniques.
 - d. Cable tray will not be lifted into position with the aid of an aerial work platform for horizontal or vertical installation.
 4. Installing vertical cable tray
 - a. When installing vertical cable tray, mechanical means are preferred to move tray into place.
 - b. If tray is manually installed, adequate personnel will be used. Area will be barricaded and tie off points will be identified. The proper number of team members will be used to assure a safe installation.
 - c. Always identify other work activities in the area.
 5. Installing Cable tray tags and punch list Items
 - a. Access and egress to the tray being labeled will be identified.
 - b. There will also be a need to identify tie off points prior to any climbing.
 6. Misc. Handling; When handling misc. pieces of tray such as small pieces or scrap for disposal:

- a. Proper PPE will be worn so team members will not be exposed to sharp edges.
- b. If one person is going to be handling the smaller pieces we need to be sure not to exceed the 50# lifting rule.
- c. We will also identify a clear path from the fabrication area to the installation area.
- d. Always identify other work activities in the area.

L. Procedure for electrical outfitting of Connex boxes for use in the field.

- 1. Electrical wiring, fixtures, and devices installed in Connex boxes shall comply with wiring methods, material, and layout as detailed in Appendix B.

7.4 P.P.E. and Tools

Training, tracking and testing of PPE, providing PPE and equipment (meters, etc.).

7.4.1 Testing of PPE

Testing of PPE					
		Test		Inspect	Calibration
Voltage rated rubber gloves		6 months		Each use	
Rubber blankets		12 months		Each use	
Hot Sticks		12 months		Each use	
Voltage testers		Each use		Each use	12 months
Rubber sleeves		6 months		Each use	
Meggers		Each use		Each use	12 months
Voltage rated tools				Inspect each use	
Cleaning of arc rated clothing (suits, etc)				As needed/Inspect each use	
Electric hazard rated boots				Inspect each use	
Cotton clothing				Inspect each use	
Ground jumpers				Inspect each use (test?)	

7.4.2 Tracking of PPE for Testing:

To be coordinated by the supervisor in charge.

7.4.3 Providing Tools and PPE

A. Voltage rated tools.

- 1. 1000V screwdrivers, 1000V wire strippers (up to size 10 AWG) *add to tool list.*
- 2. Other tools used infrequently – Job supplied.

B. Meters

- 1. 1000V or less included on electrical journeyman team member tool list.
- 2. 600V or less testers, phase rotation meters, meggers supplied by company

C. Flash Protection Kits

(suits, hoods, coveralls, face shield, visors, and gloves) - Provided by company

- 1. Kits of various calorie/cm² ratings, suitable for the applicable PPE Level.

D. Arc Rated Personal Clothing – Provided by team member.

- 1. Pants
- 2. Coveralls
- 3. Shirts

E. Selection and Maintenance of Arc Rated Clothing

- 1. Manufacturers specifications and guidelines shall be followed as set forth in NFPA 70E.
- 2. See Cianbro Electrical Safety and Arc Flash Protection Policy and Procedure for guidelines regarding Arc Rated Clothing.

7.5 Management Roles and Responsibilities

In addition to the roles and responsibilities of all Cianbro Managers, managers of electrical work have these responsibilities.

- 7.5.1 Electrical Superintendent: This person is required to thoroughly understand the capabilities of the electrical team members that work under their direction. This person will make the determination of who can work under an energized work permit. Additionally, this person would have responsibility to test and track recertification of NFPA 70E required PPE and equipment. This person would be responsible to forward said documentation to Corporate Safety for record. This person would also be responsible for training other team members on NFPA 70E on an annual basis. Also responsible for acquiring an electric work permit as per state/local requirements.
- 7.5.2 Electrical General Foreman: **This person needs a great working knowledge of NFPA 70E.** Additionally, this person would be responsible to fill out and sign the energized work permit as well as ensuring that a Cianbro manager and owner/client signs the permit PRIOR to any energized work being performed. This person will be responsible for ensuring that all required PPE is on site and will ultimately be the person who decides what level of PPE is mandatory for the specific task.
- 7.5.3 Electrical Supervisor: **This person needs a great working knowledge of NFPA 70E.** This person must understand the different electrical PPE levels, as well as implement the required boundaries. This individual is responsible to ensure that he/she has the approval of a general foreman and/or manager to engage in an energized work scenario.
- 7.5.4 Non-Electrical Manager Managing Electrical Personnel: This person must understand that if they are not conversant in NFPA 70E, they are responsible for calling the appropriate electrical personnel within their region to ensure that prior to signing off on an energized work permit, they have collaborated with and agree that all necessary precautions and signatures are in place for a safe execution of work. In addition, they should work with the electrical advisory committee and the staffers to identify the right electrical team members for the work that will be performed.

7.6 Incident Investigation

For any incident that has occurred:

- 7.6.1 Secure the Scene
Primary focus must be to avoid any further injuries and to take care of those injured. Secondary focus is to preserve the evidence.
- 7.6.2 Gather Evidence
 - A. Take pictures (keep a log of what each picture shows)
 - B. Measure and sketch area
 - C. Interview witnesses
- 7.6.3 Analyze the Evidence
 - A. Sequence of events – Why Method
 - B. Develop a time line that starts at the outcome and ends at the root causes.
- 7.6.4 The Investigation is not done until:
You have identified the root causes and how to fix them. Root causes are those causes that if fixed, ***will prevent the incident from ever happening again***. And that you have followed up to make sure the recommendations are being followed. Some adjustments may be required.

7.7 Subcontractors

- 7.7.1 Ensuring that subcontractors meet Cianbro, OSHA, and other safety requirements can be very frustrating. OSHA references their multi-employer work site policy to require that controlling contractors are responsible for the actions of subcontractors working

under them. More importantly, the actions of subcontractors can put Cianbro team members and others at risk.

7.7.2 Refer to Cianbro's Best Practices for Subcontractor on Job Sites Safety Policy and Procedure.

7.8 Safety At Home

7.8.1 OSHA estimates that approximately 1,000 electrocutions occur annually in the home. This is around three times the number of electrocutions in the workplace. One of the key contributors is that people are generally complacent when it comes to using electrical appliances and tools at home. They feel they are in a "Safe Zone" and never give safety a thought. We should strive to set a good example of safety in the home even though we may feel that it is a "Safe Zone". Use GFCI protection whenever we use electrical equipment outside, near plumbing fixtures, in damp basements etc. We should also take necessary steps to ensure that electrical outlets are protected from contact by children, and explain the hazards to them. Ensure that you inspect all cords before use.

8 Budget/Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all PPE requirements under this policy and provide necessary training.

9 Related Documents

9.1 See attachments

9.2 Documents available on Cianbro.net>Standard Operating Procedures – SOP.

Energized Work Permit	SD1063
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9.1 Appendix A

Shutdown and Lockout Procedure (Example)

Job: Saint Raphael's Cath Lab
Job #: 12345
Rev#: 1
Scheduled date: 3/6/2004 (scheduled)
Shutdown Procedure by: John Doe
Shutdown to be directed by: Jane Doe

Purpose of this procedure is for the installation of raceway, branch feeders, circuit breakers and circuit breaker installation hardware in Panel ATS #15 located in electrical room labeled V1021B.

Safety and PPE Equipment required:

- Hard hat.
- Safety glasses.
- Insulating floor mat.
- 1000 volt insulating gloves.
- Lockout/Tag out devices clearly marked with company and individual's name.
- Safety grounds.
- Insulating blankets.
- Insulating clamps.
- Proper foot protection, prefer electrical safety rated work boots.

Shutdown procedure to be as follows for normal circumstances:

1. Perform Hazard Analysis and complete Energized Work Permit as required in Safety Policy and Procedure 020.
2. Notify proper hospital personnel of the activities they will be going on around them, and inform them of hazards that are associated and not to enter work areas as clearly described.
3. Locate Panel ATS #15 which is located in an electrical closet by X-ray room. This room is labeled V1021B. Remove any equipment and/or debris of such from room and outside of room for proper access to room.
4. Install safety signs and cones/barriers outside of electrical closet to prohibit any unauthorized personnel from entering the closet and adjacent area outside of electrical closet.
5. Locate ATS #15 Normal Power Breaker which is in H/C room in basement. It is located on the outside of 13.8KV to 480 volt, 903 amps, Substation H/C #3 and is labeled "Normal Power Breaker Disconnect".
6. Locate Emergency Automatic Transfer Switch ATS #15 which is located in H/C room in basement. This is a Russell Electric Automatic Transfer Switch. It is located approximately 35 feet to the right of ATS #15 Normal Power Breaker. There are also additional Automatic Transfer Switches located in this area. It is labeled ATS #15.
7. Locate Emergency Power Breaker that feeds emergency power into ATS #15 and in turn feeds Panel ATS #15 located in electrical room V1021B. This breaker is located in panel EDP-2 which is located adjacent to 13.8 KV switchgear. This breaker is breaker #6, labeled ATS #15.
8. Put on proper PPE equipment. Safety Glasses, hard hat and 1000 volt insulating gloves for switching purposes.
9. Install insulating floor mat by Panel ATS #15 located in electrical room V1021B. Keep in place throughout entire project.
10. Remove Panel ATS #15 front panel cover. Do not remove dead front cover as of yet.
11. Place insulating blankets over top of dead front and over panel bus work. Secure with insulating clamps.
12. While keeping PPE on, install raceway holes and raceway into top of panel ATS #15.
13. Install branch feeder wiring in raceways and into panel. Do not terminate these branch feeders at this time!
14. If an electrical fish tape must be used to install branch feeders, use an insulated type (fiberglass).
15. After feeders are installed in raceway, terminate at end opposite of Panel ATS #15.
16. Test voltage meter on known live circuit at voltage it will be used.

17. Defeat automatic generator start from Automatic Transfer Switch ATS #15. This is done by lifting the generator start leads from terminals 3 & 4. Only 24 VDC present at these terminals.
18. Open Normal Power Breaker Disconnect for ATS #15. Install lockout/tag out.
19. Open Emergency Power breaker in panel EDP-2 labeled ATS #15. Install lockout/tag out.
20. Remove dead front panel cover to panel ATS #15 located in electrical room V1021B.
21. Test for loss of voltage.
22. Install safety grounds, phase to phase, phase to ground.
23. At this time, PPE for switching can be removed.
24. Start with installation of additional branch circuit breakers. Terminate branch feeders at this time as required. Keep in mind to wear proper PPE for these tasks.
25. After installation of circuit breakers, branch feeders, and raceway is complete, lockout any circuit breakers that have branch feeders connected to them with the proper lockout devices.
26. Clean all debris from panel.
27. Remove all associated tools from area.
28. Put on all proper PPE for switching and lockout removal.
29. Remove safety grounds.
30. Remove insulating blankets.
31. Install dead front panel cover.
32. Install outer panel cover.
33. Remove lockout/tag out form Emergency Power Breaker in Panel EDP-2.
34. Close Emergency Power Breaker in Panel EDP-2, labeled ATS #15.
35. Remove lockout/tag out device from Normal Power Breaker Disconnect for ATS #15.
36. Close Normal Power Breaker Disconnect for ATS #15.
37. Open transfer switch and install generator start leads back onto terminals 3 & 4.
38. Close transfer switch.
39. Test for proper voltage at Panel ATS #15 at a known source.
40. Clean and sweep all areas.
41. Notify hospital personnel project and procedure is complete.
42. Confirm proper operation of all equipment with hospital personnel.

Contingency plan:

The following procedure is a backup in case an emergency or trauma case has arrived at the facility. The power must be able to be restored back to Panel ATS #15 within a 10 minute period upon being notified. Additional personnel will be supplied by hospital and on site in case this will be required. Cianbro authorized field foreman and hospital personnel assigned to this task will be in contact with each other via two way radios supplied by hospital. Procedure will be as follows:

1. Test for proper operation of 2 way radios.
2. Upon receiving notification, clean all tools, debris and loose material from inside on panel ATS #15.
3. Lockout all breakers that are not to be used in panel ATS #15.
4. Put on proper PPE for switching.
5. Remove safety grounds.
6. Install panel cover.
7. Remove lockout/tag out devices from ATS #15 emergency power breaker in panel EDP-2, Normal Power Breaker for ATS #15 and Automatic Transfer Switch ATS #15.
8. Close Normal Power Breaker.
9. Close Emergency Power Breaker.
10. Install generator start leads back onto terminals 3 & 4 inside of Automatic Transfer Switch ATS #15.
11. Wait till emergency and/or trauma case has been completed and has been given permission by hospital personnel to continue with project.
12. Once permission has been granted, shutdown will be done as per procedure explained above for normal circumstances.

The above shutdown procedure should be followed closely and accurately. Shutdown will not occur until all parties listed below have reviewed this procedure and have signed off where required.

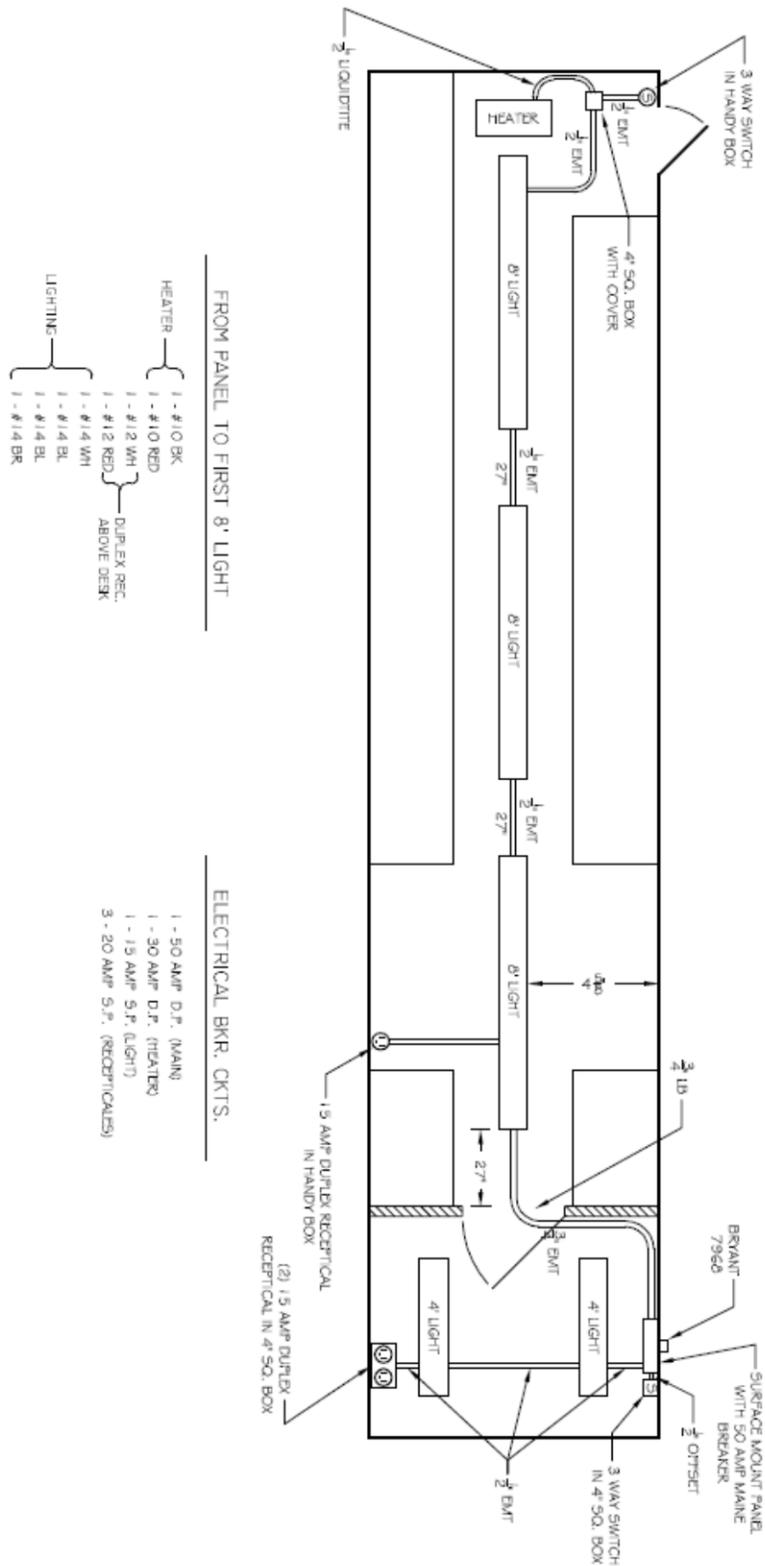
Approved by:

_____ Date: _____

_____ Date: _____

Note: This procedure is to be part of the activity plan for the work.

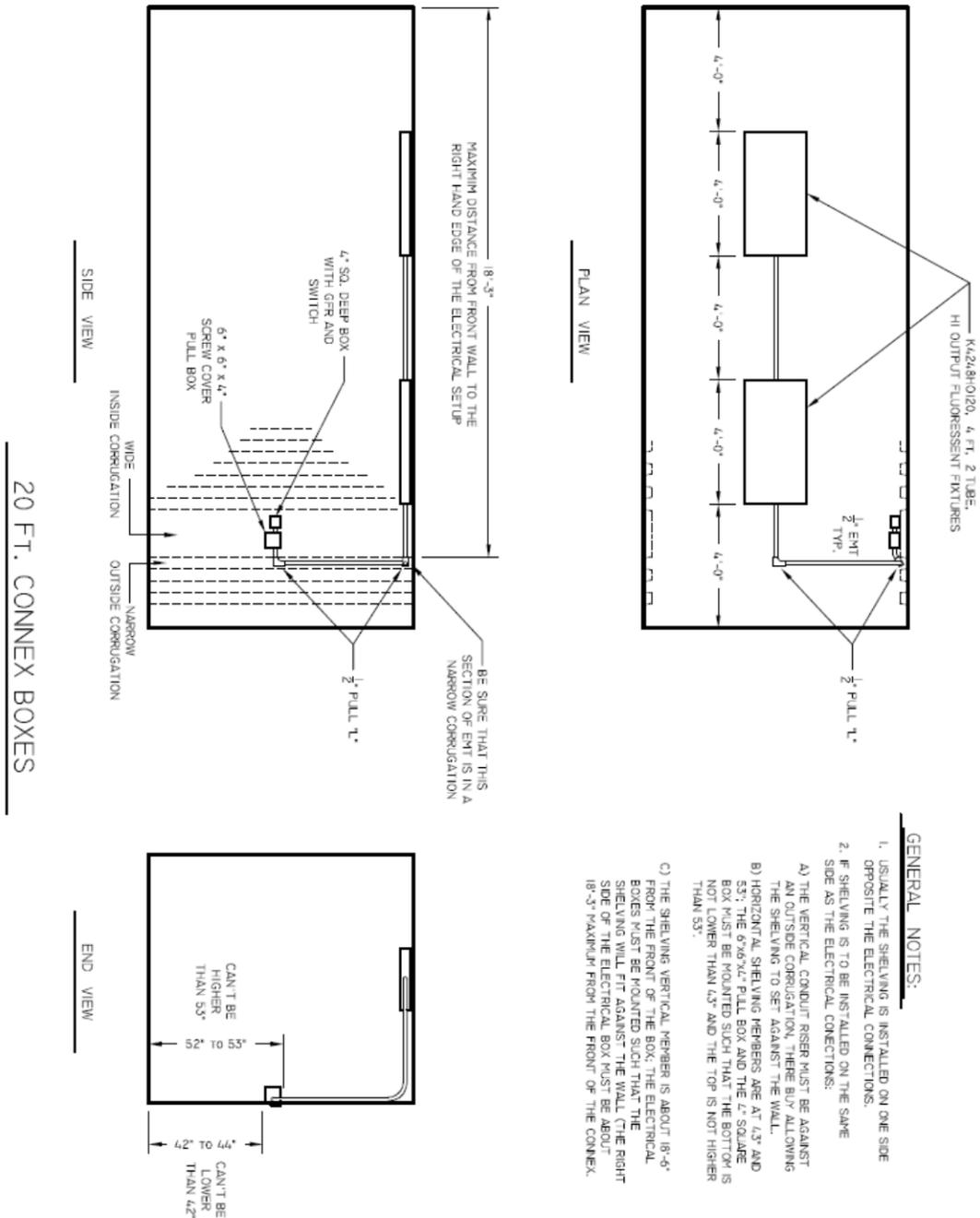
40 FT. Cargo Box Electrical Layout



Parts for 40 Ft. Conex Box

6	½ " EMT Pull L'S Set Screw
3	½" T'S with Cover, Set Screw for ½ " EMT - #Two T - 1
2	Huff 524 T heaters
1	6"x6"x6" Pull Box, Screw Cover, Lee
5	4"x4" Deep Boxes (1/2" 1 ¾' KO's)
1	20 CKT Load Center (BR2024L125)
1	CS63754/7429B Male Base with Cover
1	1 ½ " Offset (#1524DC)
2	1 ½" Lock Rings
2	1 ½" Bushings
10'	½" Liquid-Tite
2	½" Liquid-Tite Connectors, Straight
2	½" Liquid-Tite Connectors, 90"
6	270B Box Receptacles
3	GFCB 120 Breakers
3	Raco 907 Metal Covers for 2 Duplex Receptacles (4" Box Mount)
1	Bryant BR250
2	Bryant BR230's
1	Bryant BR120
250'	THHN BR #10
250'	THHN RD #10
250'	THHN GN #10
Box	#12 to 10 Fork Connectors, #8 Stud (#MV108 FBX)
150'	½" EMT
50	½" EMT Connectors, Set Screw
25	½" EMT Couplings, Set Screw
100	½" EMT Straps
6	K248 HO, 4' – Tube, High Output Fluorescent Fixtures
12	4' HO Fluorescent Lamps (#25146)
Case	Tube Guards (#2260)

20 FT. Connex Box



GENERAL NOTES:

1. USUALLY THE SHELVING IS INSTALLED ON ONE SIDE OPPOSITE THE ELECTRICAL CONNECTIONS.
2. IF SHELVING IS TO BE INSTALLED ON THE SAME SIDE AS THE ELECTRICAL CONNECTIONS:
 - A) THE VERTICAL CONDUIT RISER MUST BE AGAINST AN OUTSIDE CORRUGATION, THERE BY ALLOWING THE SHELVING TO SET AGAINST THE WALL.
 - B) HORIZONTAL SHELVING MEMBERS ARE AT 43" AND 53". THE 67/6"X4" PULL BOX AND THE 4" SQUARE BOX MUST BE MOUNTED SUCH THAT THE BOTTOM IS NOT LOWER THAN 43" AND THE TOP IS NOT HIGHER THAN 53".
 - C) THE SHELVING VERTICAL MEMBER IS ABOUT 18'-6" FROM THE FRONT OF THE BOX. THE ELECTRICAL BOXES MUST BE MOUNTED SUCH THAT THE SHELVING WILL FIT AGAINST THE WALL (THE RIGHT SIDE OF THE ELECTRICAL BOX MUST BE ABOUT 18'-3" MAXIMUM FROM THE FRONT OF THE CONNEX).

Parts for 20 Ft. Connex Box

20 Ft.	½' EMT
2 ea	¾" Offsets with 4 Lock Nuts
1 ea	1" Offset with 2 Lock Nuts
1 ea	4" Sq. Deep Box with ¾" ? ½" K.O.'s
1 ea	4" Sq. Box Cover with GFR Hole (Raco Bob)
1 ea	GFR 52 Ft. GFR
1 ea	Raco #257; 4 11/16" Cover
1 ea	Raco #832; 4 11/16" Cover
1 ea	½" Offset with 2 Lock Nuts
1 ea	Handy Box
1 ea	SPST Light Switch, Brown
1 ea	Switch Cover for Handy Box
1 ea	½" EMT Coupling
6 ea	½" EMT Connectors
6 ea	½" EMT Straps
2 ea	BR 120"s
2 ea	4', 2 Tube, Cold Start Fluorescent Fixtures
4 ea	4', 2 H.O., Fluorescent Tubes
4 ea	4" Tube Protectors

For 20A, 120v Operations

1 ea	Bryant #5278 Male base
1 ea	Red Dot #CF SR-L Cover

For 50A, 240v Operations

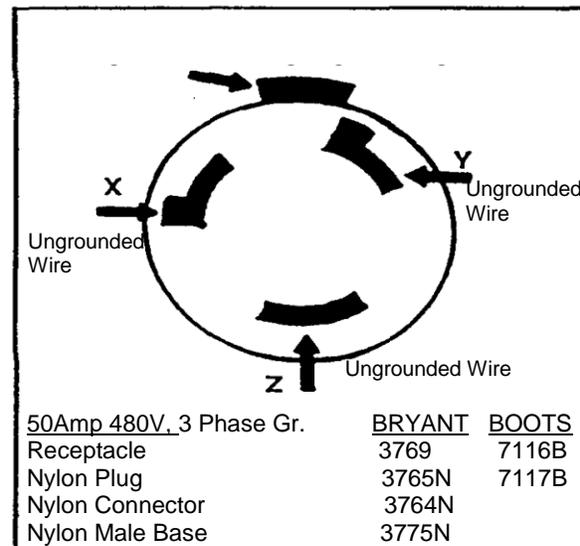
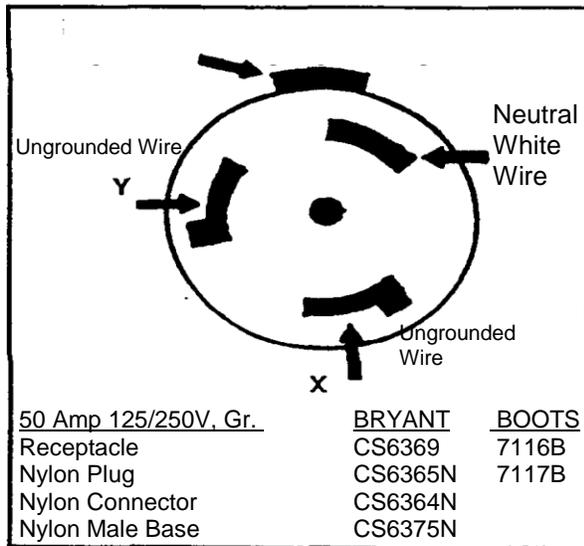
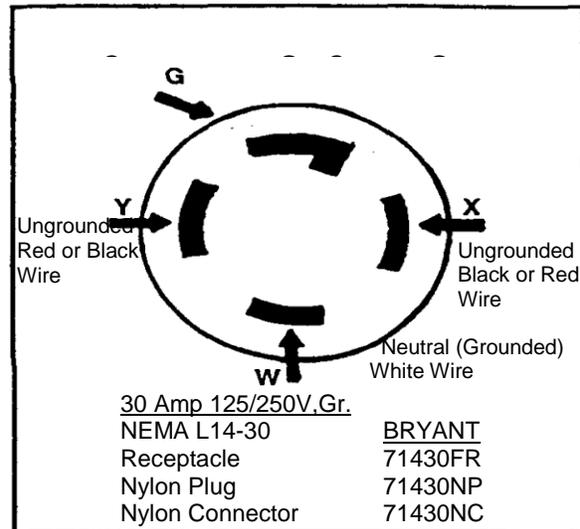
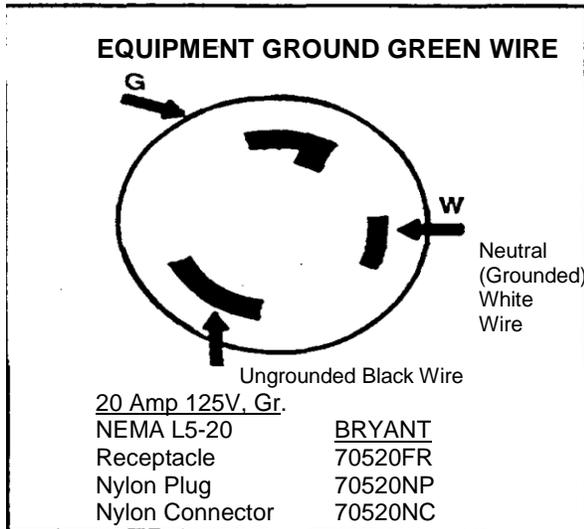
1 ea	Westinghouse S816CD or Equivalent (16 CKT Panel)
1 ea	CS6375N/7429B Combination 50A Male & Cover
1 ea	Grounding Bar (GBK-10)
1 ea	Bryant BR250
1 ea	Bryant BR230
1 ea	Berko HUH 524=TA Heater
1 ea	4" Sq Deep Box (Raco #232)
1 ea	4" Sq Box Cover with Hole for 71430 FR (Raco 812)
1 ea	71430 FR
1 ea	71430 NP

Cianbro Wiring Procedures For Portable Cords

This wiring procedure is to be used with the new style plugs only.
 This replaces the Safety Policy and Procedure dated 6-86.

Notes: 1. Bryant catalog numbers are for reference only.

Blue Box Receptacle/Spider Basket



From an electrical safety standpoint, the following items should be noted:

(A) Regarding 240 volt, 30 amp cords:

1. Must be 10/4 SO type cord or equivalent.
2. The green wire must be connected to the grounding terminal.
3. The white wire must be connected to the W (neutral) terminal.
4. The X and Y terminals should be used for the black and red (ungrounded) wires. Either black or red may be connected to either X or Y.

(B) Regarding 240 volt, 50 amp cords:

1. Must be 6/4 SO type cord or equivalent.
2. The green wire must be connected to the grounding terminal.
3. The white wire must be connected to the W (neutral) terminal.
4. The X and Y terminals should be used for the black and red (ungrounded) wires. Either black or red may be connected to either X or Y.

(C) Regarding 480 volt, 50 amp cords:

1. Must be 6/4 SO type cord or equivalent.
2. The green wire must be connected to the grounding terminal.
3. The X, Y, and Z terminals must be used for the phase conductors- Black, Red and White. Any of the three ungrounded wires may be connected to either of the terminals X, Y, or Z as long as the same connection configuration is followed on either end of the cord.

The white wire, when used as a phase conductor, must be re-identified as an ungrounded conductor per the National Electrical Code, as white is a designated color used to identify a grounded conductor.

All power cords must be tested to verify continuity:

- Between grounding conductors
- Between grounded conductors
- Between individual ungrounded conductors

All power cords must be tested to verify isolation of ungrounded conductors from grounding, grounded and other ungrounded conductors.

Refer to the "Power Cords" section of the "Small Tools Training Manual" for testing procedure.

Policy Number: 051**Authorized By:** Michael W. Bennett**Title:** Electrical Substations**Effective Date:** 08/18/09Page 1 of 30

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 To team members as they safely plan and execute work in or near energized electrical substations and switchyards.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Arc Flash:** A short circuit through air. In an arc flash incident, an enormous amount of concentrated radiant energy explodes outward from electrical equipment, creating pressure waves that can damage a person's hearing, a high-intensity flash that can damage a person's eyesight and a superheated ball of gas that can severely burn a worker's body and melt metal. The pressure waves can also send loose material like pieces of damaged equipment, tools, and other objects flying through the air.
- 4.2 **Bond:** The electrical interconnection of conductive parts to maintain a common electrical voltage.
- 4.3 **Capacitor:** Is two conductive objects separated by a dielectric (insulating) medium. It is an electrically conductive device characterized by its capacity to store an electric charge. When applied to substation safety, a capacitor is any object or conductor that has the potential to accumulate induced or direct voltage.
- 4.4 **Clearance:** A statement with documentation from the operations supervisor to an authorized individual declaring that the equipment to be worked on has been electrically isolated from all sources of primary energy.
- 4.5 **Competent Person:** A person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to team members, and who has authorization to take prompt corrective measures to eliminate them.
- 4.6 **Electrically Isolated:** Removed from all primary sources of electrical energy by opening switches, disconnects, jumpers, taps, or other means of electrical supply. The line or equipment is isolated when all switches, disconnects, jumpers, taps, or other means through which known sources of electrical energy may be supplied to the particular lines and equipment have been opened on a de-energized electrical circuit or equipment.
- 4.7 **Equipotential Work Zone:** A work zone where all equipment is interconnected by jumpers, ground rods or grids that will provide acceptable potential differences between all parts of the zone under worst case conditions of energization.

- 4.8 Fault (Current): A current that flows from one conductor to ground or to another conductor because of an abnormal connection (including an arc) between the two.
- 4.9 Ground: A conducting connection, whether intentional or accidental, by which an electrical circuit or equipment is connected to earth, or to some conductive body of relatively large extent that serves in place of earth.
- 4.10 Induction (Coupling): The process of generating time varying voltages and / or currents in otherwise unenergized conductive objects or electric circuits by the influence of the time varying electric and / or magnetic fields.
- 4.11 MAD: Minimum Approach Distance – The closest distance a qualified electrical worker can approach an exposed piece of electrical line or equipment with any conductive object.
- 4.12 Qualified Worker: A worker who, by demonstration of proficiency in the training requirements of OSHA 1910.269, possesses the ability and competency in:
- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment,
 - The skills and techniques necessary to determine the nominal voltage of exposed live parts,
 - The minimum approach distances specified in this section corresponding to the voltages to which the qualified employee will be exposed, and
 - The proper use of the special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electric equipment.
- Additionally, for a worker to be considered qualified for the purposes of performing qualified work (i.e. encroaching qualified minimum approach distances), the worker must be deemed proficient by project management.
- 4.13 Step Voltage: The difference in surface potential experienced by a person bridging a distance of one meter with the feet without contacting any other grounded object. Step voltage will be greatest near the point where the fault current enters the earth and will reduce rapidly as one moves away from that point.
- 4.14 Touch Voltage: The difference in potential between a grounded structure or station and the surface potential at the point where a person is standing while at the same time having a hand in contact with the grounded structure or object.
- 4.15 Transferred Touch Voltage: A special case of touch voltage where a voltage is conducted toward or away from a grounded structure or station to a remote point. A transferred touch voltage (potential) can be contacted between the hands or hands and feet.
- 4.16 Unqualified Worker: A worker who, through sufficient baseline awareness training, possesses the ability to recognize unsafe conditions and employ safety-related work practices at their level of work duties under the supervision of a qualified person, yet may not perform qualified work duties until they have demonstrated proficiency and deemed qualified by project management.

5 Policy

- 5.1 All Cianbro team members, subcontractors, and other personnel within our control shall comply with the requirements of this procedure in conjunction with other Owner, Federal, State, and Local requirements while working in or near energized substation and switchyards.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviations from the requirements contained in this policy.
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 The corporate safety department is responsible for maintaining this document.

7 Electrical Substations Index

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7.1 Personal Protective Equipment & Tools

7.1.1 Working in Substations presents electrical Arc Flash hazards to all team members including but not limited to, electricians, operators, ironworkers, riggers, laborers and even supervisors monitoring work activities. Electrical Arc Flash hazards require certain personal protective equipment & tools be used to safely perform the work.

7.1.2 Minimum PPE Requirements:

- ANSI approved safety glasses with side shields.
- ANSI approved hard hats.
- AR clothing while working in energized substation yards. Minimum level of protection shall be Level 2 or 8 cal/cm².
- E/H rated safety boots. No steel toe's showing on boots.
- PPE required to install personal protective grounds (Based on voltage and the NFPA flash protection charts. Refer to matrix in section 7.7.10).
- PPE required to work on battery installations. (Refer to section 7.10 Battery Safety)

7.1.3 Arc Rated (AR) Clothing

- A. The appropriate Arc Rated clothing shall be worn while working on or near energized equipment where exposure to flash and other electrical hazards are present. This includes wearing AR clothing in any energized substation or switchyard. AR Clothing shall be in good condition, free from rips, tears and fraying.
- B. Cianbro management shall determine on a case by case basis whether or not AR clothing is required on the jobsite for all workers and subcontractors. When greenfield (new construction) sites transition towards brownfield (energized) status, project management will determine when the jobsite is considered energized and AR clothing is required (NOTE: Cianbro and subcontractors will comply with AR clothing requirements if mandated by client policy). This same determination will be made for visitors and vendors entering an energized substation for purposes such as deliveries or attending meetings. Generally this would apply to people who are on site for a short period of time and are kept away from the work areas assuming it does not conflict with the Owner's policy.
- C. Cianbro Reimbursement Policy
Team members who require AR clothing for their work assignment will be credited with an allowance twice per year to purchase the safety clothing. Refer to Cianbro's current AR policy for the approved allowance amount. Personal accounts will be set up for each team member through an authorized AR clothing supplier where they may apply their allowance toward the purchase of approved AR clothing.
- On January and July of each year an Arc Rated Clothing Allowance will be issued with the authorization of the team member's Supervisor; if warranted by their job, i.e. Utility Line Workers, Electricians, and other personnel that work in energized substations.
 - Each January and July it will be the responsibility of the Supervisor to make a list of authorized personnel requiring AR and submit it to the Cianbro

Administrator for processing. A tracking log will also be maintained by the assigned Cianbro Administrator.

- It is the team member's responsibility to use the allowance to purchase their own Arc Rated clothing and to wear the necessary protective AR as required on job sites.
- Payment for any Arc Rated clothing purchased over and above the allowance will be the sole responsibility of the team member.
- Should a team member join the crew during either six month period they will be entitled to that period's allowance once approved by their Supervisor.
- AR coveralls will be furnished by Cianbro and loaned to team members working on relatively short term assignments where they may not have a selection of AR clothing or may not have received a clothing allowance previously. The coveralls shall be returned to Cianbro at the completion of the short term assignment.

7.1.4 Rubberized and Insulated PPE Application and Maintenance

A. Voltage rated rubber gloves with leather protectors shall be required for the following applications:

- When splicing ground wire to a substation ground grid in case of fault.
- While conducting work within reaching distances of un-grounded conductor or equipment that may have the possibility of becoming energized.
- During the installation or removal of ungrounded steel structures, such as lightning masts, which are relatively close to energized lines or equipment
- When applying personal protective grounds to station equipment and lines.
- When applying bonding cables between elevating work platforms (ex. Aerial lifts) and the conductive equipment being handled.
- Voltage rated rubber gloves are not required when installing personal protective grounds from construction equipment to ground grid or grounding electrode unless this is a requirement of the Utility we are working for. Equipment grounds shall be installed immediately after the equipment is moved into position to avoid a static charge build up. If ungrounded construction equipment is discovered in an area where potential induction hazards exist, then gloves shall be worn when applying grounds to protect workers from possible static shock hazards.
- The project supervisor has the authority to renounce the requirement of rubber gloves if he/she feels as though the gloves cause more of a safety hazard than without, such as work in live control cabinets with minimal work space.
- There are five classes of high voltage rubber gloves:
 - Class 0 1,000 Volts
 - Class 1 7,500 Volts
 - Class 2 17,000 Volts
 - Class 3 26,500 Volts
 - Class 4 36,000 Volts

The correct voltage rated gloves must be worn to safely protect workers while performing their work. In most substation applications, a Class 2 rubber glove is the required level of protection.

B. Rubberized/Insulated PPE Maintenance

- All electrical equipment shall be tested according to Cianbro safety policy, procedures and best practices.
- Rubber gloves shall never be worn without the leather protectors or worn inside out.
- Leather protectors shall not be worn without the rubber gloves.
- Gloves shall be exchanged whenever they are damaged or become questionably safe by the Cianbro team member to whom they are assigned.
- Rubber gloves are rated for specific electrical voltage hazards and shall not be used as regular work gloves.
- Team members shall not use another team member's rubber gloves without consent.

- Prior to use, rubber gloves must be inspected for corona cracks, tears, punctures or any other type of visual damage. The roll up air test should be utilized to inspect for leaks.
- When rubber gloves are not in use, they must be kept in a canvas bag or another approved container that will protect the gloves from being punctured or damaged and protected from the effects of sunlight.
- Rubber gloves shall never be folded or placed with any other items when they are stored away.
- Inner liners may be worn if desired.
- Always store gloves with the cuff down in the bag in the event any sharp items collect in the bottom of the bag and to prevent items from falling into the gloves.
- Substation and Electrical crews shall have their gloves inspected and tested every six months (By approved testing agency).
- Cianbro Management is responsible for maintaining the test record documentation and managing the glove and equipment inspection program.

7.1.5 Hot Sticks

- A. Hot sticks shall be taken out of service and inspected and tested every twelve months checking for any problems that will prevent them from operating properly.
- B. Before each use, hot sticks shall be inspected for the following conditions:
 - Moisture
 - Marred or cracked finish
 - Cracked, bent or broken parts
 - Excessive wear
 - Ease of action of all working parts
- C. Hot sticks shall be cleaned, prior to use with a silicon cloth or liquid “moisture eater” material.
- D. When not in use, hot sticks shall be stored in a dry location and in a protective sleeve so that the finish is not damaged.
- E. Proper hot stick lengths must be identified and used when installing grounds or testing conductors to prevent encroachment of minimum qualified distances.
- F. The minimum length for a hot stick shall be 6 feet unless longer is required to satisfy the qualified minimum approach distance of the conductor or device that is approached.

7.1.6 Personal Protective Grounds

- All ground cables shall be identified and tracked with a numbered tag installed at one end of the ground cable assembly.
- Ground cables shall be inspected and tested a minimum of once per year. Ground cable assemblies will undergo visual inspections as well as conductivity and resistivity testing to insure that they will perform correctly in the field.
- After testing, a label shall be applied to the ground cable assembly identifying the date of the test.
- Refer to Sections 7.7.7 and 7.7.8 for fabrication and inspection practices of temporary protective grounds.
- Guidance for inspecting and testing safety grounds is provided in ASTM F 2249, Standard Specification for In-Service Test Methods for Temporary Grounding Jumper Assemblies Used on De-Energized Electric Power Lines and Equipment.
- During transportation, ground cables must be coiled and tied up to prevent accidental damage.
- When not in use, ground cables shall be coiled and stored out of elements.

7.2 Training Requirements

7.2.1 Minimum Training Requirements Based on Type of Work

- A. General requirements for all types of work in Energized Substations:
 - Cianbro (or other) OSHA 1910.269 safety awareness training.
 - Cianbro Electrical Awareness Training
 - Site specific orientation

- Spotter Training as needed
- Any client mandated Access and Escort training requirements
- B. Additional requirements for Electrical Construction workers:
 - Cianbro Policy Number 020 Electrical Safety And Flash Protection
 - CPR (2/3 of the crew must be trained)
 - First Aid
 - Cianbro Institute Equipotential Grounding Training Course (2 days).
- C. Additional requirements for Non-Electrical Construction workers:
 - Excavation Safety (As needed)
- D. Subcontractor Training Requirements:
 - Same as general requirements above
 - Other specific training as required to perform work

7.2.4 Escort Policy and Delivery Protocol

- Prior to beginning projects, signage must be posted outside the yard for all delivery trucks and visitors identifying a phone number and contact they must call to gain escorted access in the event they are unable to contact any Cianbro personnel outside the gate limits.
- The Cianbro escort must be trained as a spotter if escorting trucks and shall hold an escort privileges level of access if required by client.
- All small packaged deliveries (FedEx, UPS) must be either received at the substation gate entrance, or escorted directly to the job trailer or unloading area.
- All delivery personnel must be escorted in and out of the substation.

7.3 Safe Work Clearances and Identification of Live Parts and Voltages

7.3.1 Qualified Worker

- Is trained and proficient in safety procedures
- Knows how to perform his or her job safely
- Knows the hazards associated with the job
- Is knowledgeable in the use of safety equipment, tools and PPE
- Can distinguish exposed live parts from other non-energized parts
- Can determine the voltage of live parts
- Has knowledge and understanding of the Minimum Approach Distances (MAD)
- Can identify and distinguish what a conductor is and what an insulator is
- Knows when it is necessary to apply grounds, where and how to ground
- All substation workers, regardless of qualification status, shall follow unqualified work rules and unqualified MAD for any work activity. When qualified work must be performed, it will be planned for on a case by case basis, and workers will be selected to perform such work after they are identified by project management as a qualified person.

7.3.2 OSHA Unqualified Work Distances (Minimum Approach Distances – Unqualified)

<u>Voltage</u>	<u>Distance</u>
0 - 50,000 volts	10'
69,000 volts	11'
115,000 / 138,000 volts	13'
230,000 volts	15'
345,000 volts	20'

7.3.3 OSHA Qualified Work Distances (Minimum Approach Distances – Qualified)

<u>Voltage</u>	<u>Phase to Ground</u>	<u>Phase to Phase</u>
50 V to 600 V	Avoid Contact	Avoid Contact
1 kV to 15 kV	2' 1"	2' 2"
23 kV / 28kV	2' 4"	2' 7"
34.5 kV	2' 4"	2' 7"
69 kV	3' 0"	3' 6"

115 kV	3' 2"	4' 3"
345 kV	8' 6"	12' 6"

7.3.4 Identification of Voltage Levels and Live Equipment

- A. It is necessary to understand the specific voltages that may surround any given work area in order to properly plan the work activity and consider the appropriate minimum approach distances. Some guidelines for identifying voltage values include:
- Look at the ratings and data stamped on equipment name plates.
 - Review engineering drawings of the facility or system being worked on.
 - Identify the differences in voltages on each side of any transformers in the yard (Primary and secondary voltage ratings).
 - Look for incoming transmission lines or exiting distribution lines and their posted ratings.
 - Ask questions. Seek answers and guidance from supervisors or facility owner representatives.
- B. In addition to voltage identification, it is also critical when working in substations and switchyards to be able to distinguish between energized and de-energized parts. There are a variety of work situations that may include maintenance work in a fully commissioned substation or general construction work in a new or partially commissioned yard. Each work environment is unique and may involve varying degrees of complexity and electrical hazards. The following guidelines should be considered when pre-planning the work and becoming familiar with the surrounding work area:
- Identify conductors such as transmission lines, cables; flex taps, rigid bus, energized frames, etc. Distinguish these materials from insulating materials such as glass or polymer materials.
 - Identify open switches and open breakers. Know which side of the open device is hot.
 - Look for incomplete construction that may serve as breaks in continuity or separation of energized and de-energized areas.
 - Look for attached personal protective grounds on de-energized systems (Remember, protective grounds must always be in place prior to work on any de-energized equipment).
 - Identify locks and tags on systems and / or contact clearance holder for more information on the limits of a de-energized area or system.

7.3.5 Signage and Flagging

- A. Barricades, flagging and signage play a significant role in identifying electrical hazards within a substation or switchyard. They provide visible reminders of the hazards and are effective in helping others plan their work and are necessary to keep unqualified personnel from entering restricted areas.
- B. In addition to signage within the substation, signs posted at the entrance to the yard also play an important role.
- C. Recommended temporary Cianbro signage posted at substation gate:
- Highest voltage that can be expected in substation
 - 100 % AR clothing (if required)
 - ANSI approved safety glasses with side shields
 - ANSI approved hard hats
 - E/H safety toed boots
 - OSHA unqualified work distance
 - OSHA qualified work distances
 - Notify utility company before entry and when leaving for day
 - Keep deliveries outside of substation or escort all deliveries. Call.....
 - Lock gate after entering or exiting
- D. When operating equipment near energized conductors or devices, a highly visible and elevated warning line or demarcation shall be established to alert operators and workers when equipment is approaching minimum approach distances (qualified or unqualified). This warning system is in addition to a qualified worker who serves as a spotter. The spotter will maintain continuous visual contact and

communication with the operator and has the authority to halt all operations or equipment movement if hazardous situations occur. Spotter must be a qualified/certified signal person.

7.4 Excavations in Energized Substation Yards

- 7.4.1 Just as in every sector of construction, planning is the most important step in risk management. Knowing where electrical lines are reduces the odds of an incident. Cianbro and subcontractor supervisors and their operators need to thoroughly plan their work with consideration given to the hazards of the work environment.
- Cianbro and subcontractor supervisors and operators must obtain and evaluate all documentation and drawings pertaining to the above and below ground utilities on site in addition to identifying other hazards and obstacles in the yard.
 - Dig-Safe must be notified at least 72 hours (3 business days) in advance of any excavation work inside or outside the substation fence. Although the various utility companies representing Dig-Safe may not survey areas inside the substation fence on private property, they will be able to identify any buried utility that may be present just outside the perimeter fence and thus provide an indication as to whether or not any utilities may pass through the yard.
 - The selection of all construction equipment utilized in energized substation yards must be approved by the Cianbro supervisor including equipment proposed for use by subcontractors. Consideration must be given to the size and type of equipment and its proximity to energized components. Other recommendations such as the use of toothless digging buckets shall be implemented when necessary.
 - Prior to excavation, a survey of the area shall be conducted by a qualified person to help identify whether or not buried utilities exist. In addition to reviewing site drawings, as-built drawings and Dig-Safe markings, the qualified person shall utilize a cable detection tool designed to locate buried utilities for mapping out the work area.
 - Barricades will be established to identify various hazards in the yard, such as energized vs. de-energized zones, open excavations, etc.
 - A designated qualified spotter shall be assigned to the operator and must have completed Cianbro's spotter training. The spotter's sole purpose is to watch for hazards and to monitor safe clearances to exposed lines and equipment at all times when the equipment is operating and ensure that minimum approach distances are kept. Refer to additional Spotter requirements in section 7.10
 - In addition to qualified operators and spotters, there must also always be a qualified electrical person assigned to the site when excavating in energized yards regardless of whether excavation work is performed by Cianbro or a subcontractor.
 - Maintain safe slopes and appropriate barricades at all times. Refer to Cianbro safety policy and procedure for Excavation Safety.
 - Cianbro supervision shall coordinate all changes in underground utility installations with the appropriate engineer to ensure accurate and complete as-built conditions are documented for future reference.
 - Construction equipment shall be properly grounded at all times while working in energized yards or near other sources of high voltage energy.
 - Safe minimum approach distances must be considered in the pre-planning when performing excavations in energized yards. It is the responsibility of the first line supervisor, spotter, and operator to ensure safe distances are maintained.
 - Never move dump trucks unless their dump bodies are in the fully down position.
 - It may be necessary in congested areas or when buried utilities are anticipated to implement hand digging in lieu of machine digging. Proper excavation methods shall be determined in the job hazard analysis.
 - All construction equipment shall be inspected daily prior to use.
- 7.4.2 Ground Grid Integrity
- Avoid cutting through existing ground grid conductors when possible during foundation installation or other work below the grid.
 - At a minimum, Class 2 high voltage rubber gloves shall be worn to cut the ground grid, splicing, or re-routing the ground grid conductors.

- Install temporary jumpers across cut ground grid conductors until work in the area is complete and permanent repairs or new ground grid sections are added.
- Any other precautionary work practices will be employed to protect workers from differences in potential when working in excavations. This may include the use of high voltage rubber gloves, bonding of equipment, ground mats, or transition mats. These additional work practices will be determined by project management and the qualified supervisor in charge of the work.

7.5 Current Flow and Effects on the Human Body

7.5.1 The human body is a natural conductor of electricity and since current always seeks ground and will take any and all paths to ground, a person's body may become the path for current if placed in an electrically unsafe condition. The effect of current on the body depends on the amount of current, the duration of current flow, and the specific path the current takes through the body. When current flow is through the heart, the chance of severe injury or death is the greatest. Cardiac arrest or fibrillation can occur when current above 50 ma passes through the heart. The most severe electrical burns occur when the current flow is over 200 ma. The heart is vulnerable since it is in the path of two common pathways through the body. Specifically, hand-to-hand and hand-to-foot contact pathways.

7.5.2 Individuals react differently to current values as a result of their makeup, size, and body resistance. Resistance can alter the effects of current flow through the body. Skin provides much more resistance to current flow than does muscle tissue. With dry skin, current is less likely to travel across the skin surface and more likely to flow through muscle tissue. Impurities in the moisture on skin however, can enhance the conductive nature of the skin.

Dalziel's Research Data:

<u>Body Effect</u>	<u>Gender</u>	<u>60 HZ AC</u>
Slight sensation at point(s) of contact	Men	0.4 mA
	Women	0.3 mA
Threshold of Bodily Perception	Men	1.1 mA
	Women	0.7 mA
Pain, with Voluntary Muscle Control	Men	9.0 mA
	Women	6.0 mA
Pain, with loss of Voluntary Muscle Control	Men	16.0 mA
	Women	10.5 mA
Severe Pain, Difficulty Breathing	Men	23 mA
	Women	15 mA
Possible Heart Fibrillation after 3 Seconds	Men	100 mA
	Women	100 mA

7.5.3 From Dalziel's research data we know the fibrillation threshold is about 100 ma or 0.100 amps. Since the average human body has 500 to 1500 ohms of resistance Ohm's Law will yield the following:

- $V = IR = (0.100\text{amps}) \times (500\text{ ohm}) = 50\text{ volts}$

7.5.4 Under the right conditions and depending on the individual, this 50 volt threshold may cause ventricular fibrillation and can be life threatening. From Ohm's Law Current and Resistance are inversely proportional. The higher the resistance the lower the current will be through any circuit. Thus, wearing the proper PPE to insulate including rubber gloves and boots increases the resistance factor through a worker and therefore further reduces the risk of unsafe current levels passing through the body.

7.6 Establishing an Electrically Safe Work Condition

7.6.1 Establishing a Safe Worksite

A. Prior to beginning any work activity a job hazard analysis must be conducted that will lead to the establishment of an electrically safe work area. The process of turning off the power, verifying that it is off and ensuring that it stays off while work is being performed is considered establishing an electrically safe work condition. There are six steps to consider in this process:

- *Identify all power sources* – Walk down the project site identifying sources of power. Review electrical drawings and current as-built information for immediate site as well as for any remote end sites affected by the switching orders. Work with facility manager for guidance.
- *Disconnect all power sources* – Open appropriate disconnect switches and circuit breakers.
- *Verify that the power is off* – Do a visual inspection to verify that circuit breakers and switch blades are in the open position for the work site and confirm with the Utility representative that any remote end switching devices have been confirmed open. Disconnecting devices may malfunction and fail to open all phase conductors when operated. After operating the handle of any enclosed disconnect, a qualified person should open the equipment door or cover to visually verify that there is a physical opening, air gap, in each blade.
- *Lockout /Tagout systems* – Apply lockout tags and locking devices to open equipment in accordance with an approved lockout policy for the work site. On some sites the lockout tags and locking devices may be applied by the Utility Representative on site according to that utility's lockout policy. Under these circumstances, it may be necessary to work under their clearances and tagging methods. Refer to section 7.6.3 for additional information.
- *Verify again that the power is off by testing* – Use a voltage detector rated for the given voltage to test each phase conductor or circuit to verify a de-energized condition exists. Before and after each test, test the tester against a known energy source to verify it is operating properly (Refer to Section 7.7.9).
- *Discharge stored electrical energy* - Some substation components may have characteristics similar to capacitors where stored electrical energy or induced voltages exist. Install personal protective grounds as necessary before touching any such components (Refer to section 7.7 Personal Protective Grounding).

7.6.2 Dispatching and Clearances

- All oral communication about dispatching and clearances shall be recorded by the person receiving them and shall be read back to the person giving them. System clearances shall be documented on a site specific clearance form and shall be signed between the clearance holder and the dispatcher. Before systems are re-energized, the clearance holder and dispatcher will sign-off the clearance form to verify that team members are clear of the area and the systems is ready to re-energize.
- Under no circumstances shall clearances be granted or released on a predetermined time basis. (More for distribution work).
- If the person who received the clearance must leave the work site before it is completed, they shall so inform the dispatcher, giving the name of the person who will take his/her place. In such cases, the dispatcher shall communicate with both people, releasing the one who is leaving and accepting the other as authorized to report for him/her. Clear and precise entries of all such authorized changes shall be made on the dispatcher's records and hold tags.
- When the work is completed, the grounds removed and all the workers and possible hazards are clear, the team member who received the clearance, or their properly authorized substitute, shall report to the person having jurisdiction that the line or apparatus is ready for service.

7.6.3 Lockout / Tagout and Work Area Isolation

- Most of our Utility Clients have their own procedures for addressing lockout / tagout, zero energy isolation, clearance holders and switching / tagging orders necessary to ensure a safe work zone for their people as well as any contractor

working in their substation and switch yards. It is the responsibility of the Cianbro site supervisor to work closely with the Owners representative at the beginning of each project to understand and agree to a project specific process necessary to protect all personnel on site from all sources of energy. Refer to OSHA section 1910.269 for specific requirements. The following minimum standards must be met to achieve and secure a safe work area:

LOTO for Transmission & Distribution Lines and Substation Yard Work:

- Identify Owner and Contractor authorized responsible person.
- Identify Clearance Holder (Usually Owner Representative).
- Request a copy of the Owners Switching / Tagging Orders before commencing outage work or entering new work areas.
- Identify and document on system one line diagrams and/or other facility documents all sources of energy that must be isolated and all the necessary switches, breakers, and other equipment that must be opened to electrically isolate the work area. Verify this is consistent with Switching Orders.
- Identify and document locations for personal protective ground sets necessary to isolate the work area. Record information including the ground set number, location, date installed, date removed and the authorized responsible person. Verify that the grounds are in place on a daily basis.
- Implementation of a tagging system for isolation ground sets should be considered depending on the complexity of the project. Tags are not required for non-clearance / isolation grounds including construction equipment grounds.
- Develop project specific procedure with Owner Representative for application of locks and/or tags on switching devices and ground sets. Procedure shall address notification and concurrence of Owner and Contractor Authorized Responsible Persons prior to initiating any switching orders including closing switches or removing grounds prior to re-energization.
- Test for zero voltage prior to beginning work.
- Hold tailboard meeting with crews to review plan prior to beginning work.

LOTO for AC and DC Power and Control Systems (Control House Work)

- Refer to OSHA 1910.269 Policy for specific requirements.
- Work with Owner Rep or Commissioning Engineer to identify all sources of power in the proposed work area.
- Isolate all power sources by opening breakers or de-terminating wires as necessary.
- Implement LOTO program. Tags in lieu of locks may be considered on a case by case basis when it can be demonstrated that the tagging process is as effective as locks.
- Test for zero voltage prior to beginning work.
- Hold tailboard meeting with crews to review plan prior to beginning work.

7.7 Personal Protective Grounding

7.7.1 Purpose

- The purpose of this grounding procedure is to establish policy that will provide maximum protection against electrical shock to all personnel working on or near de-energized lines or substation equipment.

7.7.2 Establishing an Equipotential Work Zone

- A. An "Equipotential Work Zone" is a work zone where all substation equipment is interconnected or bonded together by jumpers, ground rods and / or grids that will provide acceptable potential differences (close to equal) between all parts of the zone under worst case conditions of energization. In order to provide true equipotential protection for workers, all construction vehicles and equipment working near power lines must also be grounded. Therefore, an equipotential zone is an area where workers are protected from dangerous step and touch potentials under worst case conditions.

- B. Grounding and bonding are necessary to ensure that all work is performed in an established Equipotential Zone in order to prevent accidental death or injury to workers from electrical shock. Proper grounding and bonding will reduce voltage differences across the worker to the lowest practical value in the event the line or equipment being worked on becomes charged. The basic difference between bonding and grounding is that bonding interconnects conductive parts to maintain a common voltage (Not necessarily zero) creating an equipotential zone between those parts whereas a ground actually connects to earth and gives voltage a place to go or discharge. People sometimes confuse grounded objects with bonded objects due to the fact that they both usually involve a copper conductor or jumper.
- C. Temporary protective grounds shall be placed at such locations and arranged in such a manner as to prevent each team member from being exposed to hazardous differences in electrical potential.

High voltage lines and equipment shall be considered energized and appropriate minimum approach distances shall be adhered to until lines are tested and protective grounds are installed.

- D. Personal protective grounds are installed to protect against:
- Inadvertent or accidental energization of lines or equipment. Protective grounds limit the voltage rise in the work area to safe levels in the event the equipment being worked on is accidentally energized. They provide a low resistance / fast path for fault current to follow thus allowing upstream protective devices to trip.
 - Induced voltage from nearby energized lines or equipment and static charges as a result of wind and weather.

Inadvertent energization may be prevented through proper lock out and communication between all parties involved at the job site. Adherence to the principles identified in “Establishing an Electrically Safe Work Condition” above are also critical in preventing accidental energization. Inadvertent energization may also be caused by conditions beyond the control of the project including vehicle accidents, lightning strikes, unexpected back feed sources such as portable generators, and equipment malfunction.

Induced voltages from adjacent energized lines and equipment can be just as dangerous as accidental energization conditions and may perhaps be less obvious to recognize and predict due to variables such as weather, proximity, voltage levels, etc. Potential problems include Electrostatic Induction and Electromagnetic Induction.

- E. Electrostatic induction occurs when an ungrounded open conductor acts like a capacitor and picks up a charge from wind blowing across large expanses of wire or from other sources. Electromagnetic induction occurs when an ungrounded open conductor picks up an induced voltage from an energized line running parallel to the ungrounded open conductor or from energized equipment nearby.
- F. Proper placement of personal protective grounds is essential and they should be placed as close to the work location as possible to dissipate induced voltages. If substation equipment becomes energized, potentially hazardous voltage differences can result. Protective grounds will limit excessive voltage differences in the work area in conjunction with proper work procedures that will reduce exposure to step, touch, and transferred touch voltages on the ground. The most important rule in safe grounding is to ensure that the worker is never in series with a grounding system component. Specifically, if a worker touches an energized line or part that is not properly grounded, they may become part of the circuit as a human conductor, in series, as shown on the left side of Figure 1. Electrical shock hazards also exist when a person is placed in a parallel circuit arrangement as indicated on the right side of Figure 1.

It is often stated that “Current will take the path of least resistance to ground”. Actually, current will take all paths to ground.

- G. Even though very low resistance ground cables may have been installed in your substation work area, by touching the same conductive part or bonded part that is grounded a worker becomes a parallel circuit to ground. In the event of a fault or induced current, the worker's body resistance and the resistance of other circuits in parallel will determine just how much of the current will be conducted through each circuit including the one through the worker. With proper grounding, a low resistance ground cable will provide a quick path for a large surge of current to travel to ground causing upstream protective devices to trip thus reducing the amount of time a worker may be exposed to the current (Refer to section 7.5 for current flow effects on the human body).
- H. When a worker is placed in series there is only one path to ground for the fault which is through the worker's body. This series circuit condition can be very hazardous and may exist when ground cables are not installed in the work area. Without a ground there is no unencumbered parallel path for the fault current to take. Depending on the overall resistance of the worker, their PPE and the platform they are standing on, a fault current may pass to ground that is too small to trip upstream devices but large enough to cause injury or death to the worker.

Figure 1 Current Path

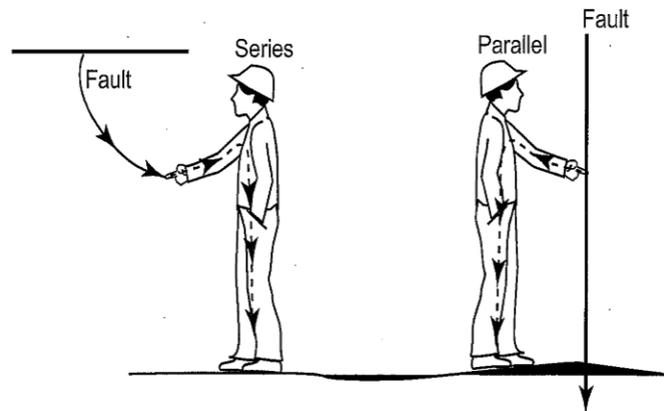
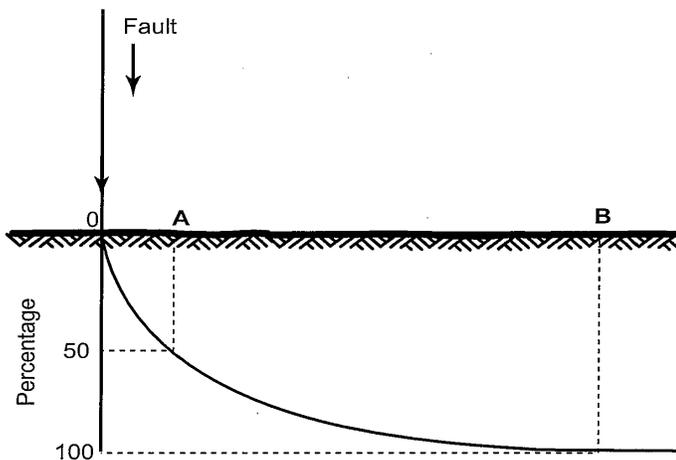


Figure 1
Current Path

Figure 2 depicts the voltage rise curve used to demonstrate step and touch voltages. As the distance from the contact between the fault and the earth increases, the amount of resistive soil in between also increases.



NOTE: The distance from the fault to points A and B depend on fault magnitude and soil resistivity.

Figure 2
Voltage Rise Curve
Rev. 06/04/15

Step, touch, and transferred touch voltages occur when there is a difference in potential between two points (Refer to figure 3). These voltages result from the energization of a grounded conductive object either by accidental energization or through continuous induced current.

Figure 3 Step and Touch Voltages

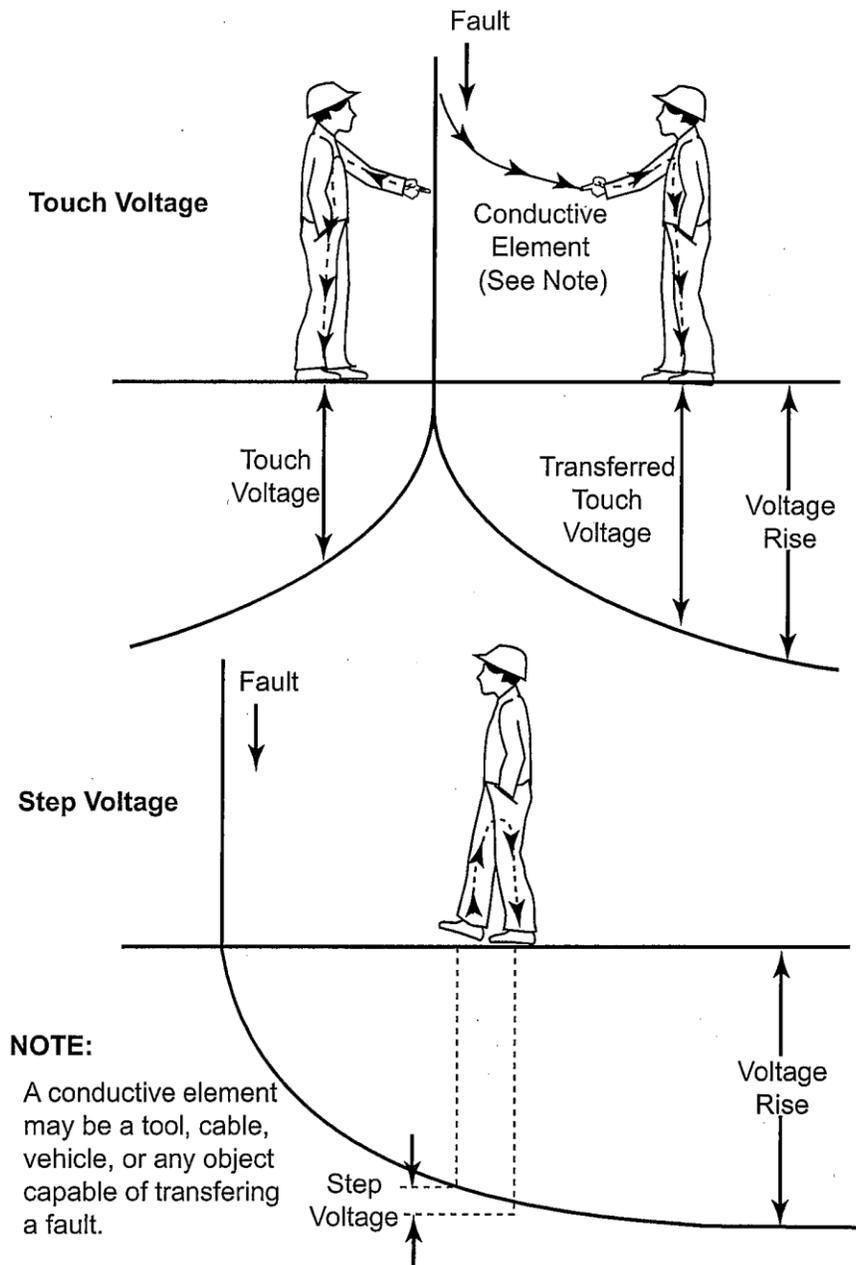


Figure 3
Step and Touch Voltages

- A. Protection against step and touch voltages may be accomplished in three ways:
- *Equipotential* is obtained by keeping the person and reaching limits confined to an equipotential surface.

- *Insulation* is obtained by using insulated platforms, footwear, gloves, etc. insulated from the maximum anticipated fault or induced current at the worksite.
 - *Isolation* is accomplished by limiting or restricting the approach distance to grounding systems with barricades or fencing. Barricading is the most efficient way to protect against step and touch voltages.
- B. Thorough job preplanning is the key to establishing an equipotential zone or work site. Preplanning includes knowing the layout of the job site; the location of needed equipment, tools and materials; and where workers will need to be. Preplanning should also take into consideration the job site soil conditions and terrain, expected weather conditions, available fault current and characteristics, and any nearby energized lines. Using this information, a strategy should be developed to provide a safe worksite using grounding, insulation, isolation, or a combination of these methods.

7.7.3 Switchyard and Substation Protective Grounding Standards

The following grounding standards shall be followed when performing work on de-energized switchyard and substation equipment and lines:

- Cianbro crews shall install their own personal protective grounds as required to guard against accidental and / or induced voltages and shall not rely on the grounds that may be installed by other contractors or crews not directly involved with the specific work activity. In certain circumstances the Utility's grounding rules may require that we deviate from these rules in order to comply with their rules. In these cases, Cianbro will follow the rules of the utility as long as they provide adequate protection for our Team Members.
- High voltage lines and equipment shall be considered energized and appropriate minimum approach distances adhered to until testing is complete and protective grounds are installed.
- Work on de-energized equipment and lines must be performed with protective grounds on each phase of the electrical system.
- Grounding cables should be visible from the work area.
- Grounding cables should be installed expeditiously after testing for no line potential.
- No switch or circuit breaker shall be used to maintain continuity between the protective grounds and the work area.
- Protective grounds should be installed as close to the work area as possible to minimize exposure voltage but, not so close that they may endanger the workers from whipping due to electromechanical separation forces in the event of a fault. In general, the grounds should be installed within reaching distance of a hot stick. Care must be taken to securely tie the cables to the structure to minimize cable movement under fault conditions.
- Do not coil grounding cables when installed.
- Shorter cable lengths reduce the electrical resistance and thus lessen the voltage drop across the grounding cables. Shorter cables are also lighter and easier to handle and reduce the chance of injury due to whipping during a fault.
- Verify the station ground connection you are attaching to is intact and grounded properly before connecting personal protective grounds.
- Size of ground cable should be adequate to handle maximum anticipated fault current. Copper cable sized 4/0 AWG is required for substation applications unless the customer utility has performed engineering studies and have standards that allow smaller sized grounds. Use of two ground cables per phase may be necessary where fault current-time energy values may exceed fusing current-time capability of a single ground assembly. Additionally, it is standard to use two ground cables for drops greater than 30-feet. When two ground cables are used they must be of equal length and be located as close to one another as possible to minimize any circulation of currents.
- Personal protective grounding shall be applied to de-energized lines or equipment with a nominal voltage rating over 600 volts. It is not necessary to ground

equipment under 600 volts as this may create unnecessary hazards due to limited approach distances and close proximity between conductors and grounded parts. If circuits are not grounded, they shall be rendered safe through Job Hazard Analysis and the establishment of an electrically safe work area.

- Make sure there are no fuses, disconnects, recloser switches, breakers, and/or transformers between you and your trip ground.
- “Grounds may be removed temporarily during tests. During the test procedure, the employer shall ensure that each team member uses insulating equipment and is isolated from and hazards involved, and the employer shall institute and additional measures as may be necessary to protect each exposed team member in case the previously grounded lines and equipment become energized.” OSHA 1910.269(n)(9).
- If two bare conductors are to be spliced, the conductors shall be bonded and grounded before being spliced. An example where this is applicable is when a ground grid section is damaged or severed during excavation operations and requires a splice.
- When grounds are applied, team members on the ground must keep clear of any ground attachments or grounded equipment to avoid the risk of step potential hazards. Also, possible whipping action of the grounds caused by a fault could strike and cause injury to anyone within a close distance.

It is common to hear “If it’s not grounded it’s not dead”. Remember, installing a ground cable does not mean you have rendered the system dead. The system may still become energized from accidental faults or from continuous induced voltages. Installing ground cables only ensures a short-circuit path to ground.

7.7.4 Switchyard and Substation Equipment Grounding Guidelines

- A. When determining the location and placement of personal protective grounds within a de-energized work site, it is important to consider all potential sources of voltage including faults from accidental re-energization of lines and induced voltages from adjacent parallel energized lines or equipment.
- B. The following examples illustrate proper grounding methods for several work situations.
 - Example 1: A substation crew is installing line taps at the top of the dead end structure between the 115kV line and line switch (Figure 1). The proper placement for personal protective grounds is PPG 1 and PPG2. In these locations the grounds positioned on each line phase will satisfy and protect against both accidental fault current through the transmission line and induced voltages from nearby energized lines and the grounds on the bus will give protection at the open blade of the line switch providing a work zone that does not break the listed unqualified work distances. Placing grounds at location PPG 2 alone would not protect the workers on both accounts since the workers would be in a dangerous position upstream of the grounds and the open line switch would not allow induced voltages to bleed off through ground PPG 2.

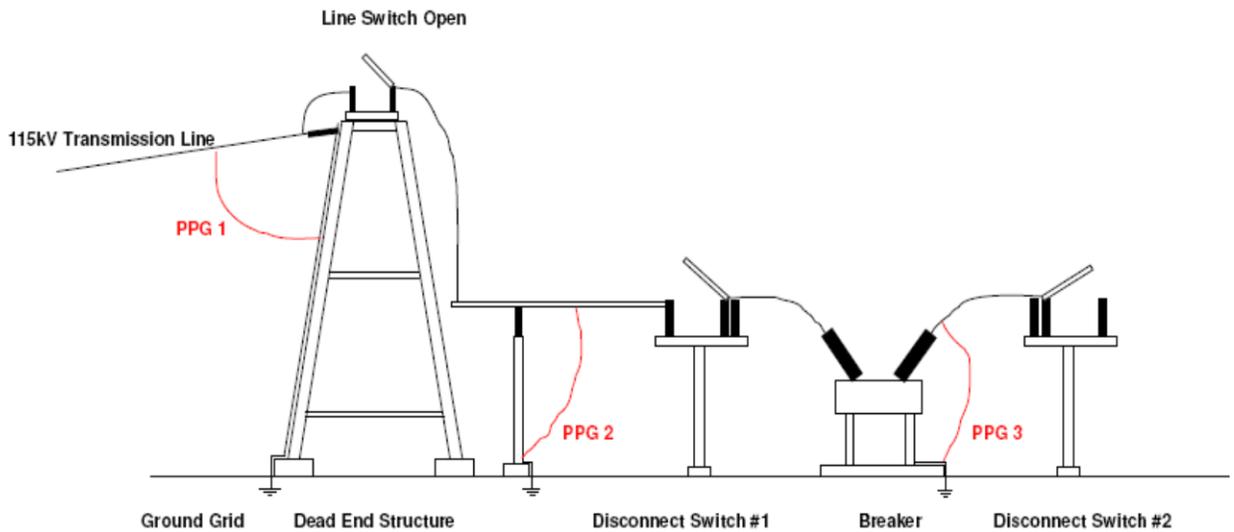


FIGURE 1

- Example 2: A substation crew is adjusting disconnect switch #2 (Figure 2). The proper placement of personal protective grounds is PPG 2. Although PPG 1 would protect the workers against accidental re-energization of the 115kV line upstream of them, PPG 1 would not be the best position to protect against induced voltages and it would violate the rule that we never depend on a breaker as part of our grounding protection plan. PPG 2 is the only choice since it is closer to the work area and is connected to the switch being worked on.

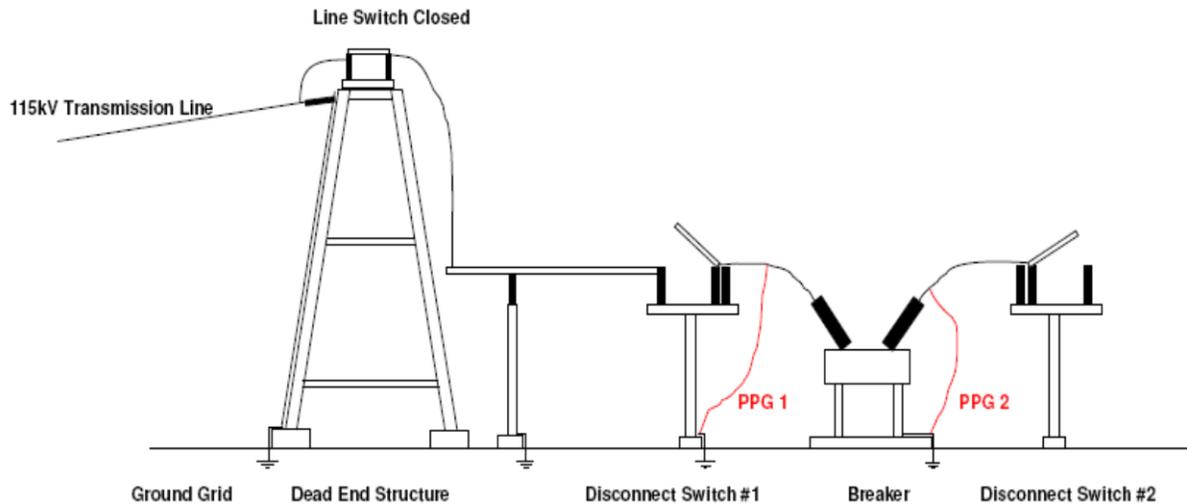


FIGURE 2

7.7.5 Preferred Grounding Points

- New installations should include attachment points which accommodate the standard lengths of grounding cable. Welded grounded studs should be utilized when possible otherwise, grounding cables should be attached to the conductor, bus, or cable and the substation ground grid or, if necessary, a steel structure.
- In the order of most effective to least effective, the following guideline should be utilized to ensure effective personal protective grounding.
 - Designed ground point or ground bus
 - Substation ground grid
 - Common Neutral

- Multi-grounded system
- Structure ground – Pole ground rod, footing ground, etc.
- Grounded steel structure
- Temporary driven ground rod

7.7.6 Procedure for Attaching Personal Protective Grounds

- A. Prior to installation of any personal protective grounds the establishment of an electrically safe work area must be met (Refer to section 7.6).
- B. The following identifies the general procedure for attaching personal protective grounds:
 - Inspect all ground assemblies.
 - Clean structural grounding stud or grounded attachment point to ensure good contact.
 - Wear appropriate PPE required for specific grounding task.
 - Test for no potential at exact locations where grounds are to be installed.
 - Tightly attach the ground clamp on the grounding cable.
 - Tighten the ground clamp locking bolt.
 - Clean equipment grounding stud, bus or cable terminal.
 - Tightly attach the ground clamp to the equipment grounding stud, bus or cable terminal.
- C. For Individual Phase Grounding where each phase is grounded separately to the ground terminal:
 - First, attach one end of each grounding cable to the ground source attachment point.
 - Second, attach the other end of each ground cable to the equipment grounding point for all three phases.
 - When removing grounds, first remove the equipment grounding connections. Second, remove the grounding terminal connections.
- D. For Phase to Phase Grounding where grounding cables are connected in series across each phase:
 - First, attach one end of the cable to ground. Attach the other end to the nearest phase to be grounded.
 - Second, attach one end of a second cable to the first phase grounded. Attach the other end to the second phase to be grounded.
 - Third, attach one end of a third cable to the second phase grounded. Attach the other end to the third phase to be grounded.
 - When removing the phase to phase grounds, reverse the above procedure, always disconnecting the ungrounded end of each cable first and working from the last phase grounded back toward the grounding terminal end of the first grounding cable.
- E. For vehicle and construction equipment grounding:
 - Parked vehicles that are involved in the substation work activities or in the general area shall be grounded to the station ground grid or mat.
 - Vehicle ground cables shall be completely removed from any reels or holders and laid to minimize inductive effects. Under no circumstances should a ground cable be coiled when in use.
 - When applying grounds, it is recommended that attachment be made to the vehicle or construction equipment ground point first, then to the substation ground grid to prevent arcing near the vehicle or equipment's fuel source.
 - When working out of non-insulated aerial lift baskets, a ground cable should be attached to the frame of the lift equipment and it is recommended that a bond jumper be installed (high voltage rubber gloves required) from the basket to the conductor(s) or device(s) being worked on prior to handling the conductor or device. This is to ensure workers in the basket are maintained at the same potential. The bond is recommended since there may be too many poor conducting connections through the aerial lift to the ground connection at the

base of the lift. The bond may be established using a suitable personal protective ground installed directly between the conductors or devices and the platform as soon as possible after positioning and should remain in place as long as work is being performed. Bonding cables should be used in addition to any required grounding cables. Site supervisor shall evaluate when bond jumpers are required. Bond jumpers shall be a minimum size #6 AWG copper.

- The correct grounding clamp or suitable equivalent must be used on all equipment that does not have a pre-fabricated grounding attachment.
- Equipment grounds shall be installed immediately after the equipment is moved into position to avoid a static charge build up. If ungrounded construction equipment is discovered in an area where potential induction hazards exist, then gloves shall be worn when applying grounds to protect workers from possible static shock hazards.

7.7.7 Ground Cable Assemblies

- A. When fabricating temporary grounds, Cianbro will adhere to the following procedures:
 - Select appropriate ASTM approved ferrule for the type of clamp being used.
 - ASTM F 855 Grade 5 Copper Ground Cable size 4/0 AWG shall be used for all ground cable assemblies used in substations.
 - Cut 4/0 copper grounding cable to the desired length.
 - Refer to the insert distance specified on the ferrule and strip 4/0 lead to that specified length. (Usually 2 ¼", depending on ferrule type).
 - Be sure that the open ferrule edge butts up against the edge of the cable insulation to verify that the bare copper lead is fully inserted.
- B. Identify the manufacturer's groove indicators located on the crimping end of the ferrule for placement of each crimp.
- C. Crimp the ferrule to the 4/0 copper by following the groove indicators using a Burndy Y35 or equivalent hydraulic crimper.
- D. Inspect the connection to ensure that the conductor cable is in place and secure.
- E. Install a 5"-6" section of heat shrink tubing over the ferrule crimp barrel and cable and heat shrink into position.
- F. Attach the corresponding clamp to the ferrule terminal in accordance to the manufacturer's instructions. Be sure that the solid portion of the ferrule is placed directly between the saddle clamp and the conductor clamp.
- G. Tighten the saddle clamp bolt (approximately 25 ft-lb torque).
- H. Install stamped tag onto ground lead identifying the following information:
 - Cianbro Corp.
 - Size of Grounds (4/0 required for substations)
 - Testing Specifications
 - Date Fabricated
 - Date Tested
- I. Test grounds using Cianbro's protective-grounding-set tester manufactured by Chance Power Systems. Be sure to follow the manufacturer's operating procedures and apply the correct voltage specified for that size ground cable (specified voltages are identified on the tester).
- J. Prior to conducting the protective ground test, the person conducting the test must watch the manufacturer's instruction video on how to operate the tester. The Chance tester identifies the resistance of the ground lead, which is indicated on a digital display panel. The tester then compares the resistance (milliohms) to the preset threshold, which should always be set for 4/0 when testing substation temporary grounds. If the ground lead has less resistance than the preset amount, then the tester will flash a green "Pass" indicator. If the grounds have a higher resistance, then the tester will flash a red "Fail" indicator.

Ground Cable Assembly



7.7.8 Field Maintenance & Inspections of Personal Protective Grounds

- Ensure that the cable and clamps are properly sized and rated for the specific application. 4/0 ground cable assemblies are required in substations.
- Make sure cables are properly terminated and compression connected in the ferrule.
- Ensure there are no broken, frayed, or discolored stranding and that there are no fused-ferrule terminations.
- Inspect cable for kinks, twists, scuffs, or cuts in the insulation or conductor before each use.
- Ensure that the serrated jaws, clamping jaw pins, and other clamping equipment is operating properly and is not excessively worn. Look for broken or loose fittings.
- Verify that the grounding cable connection to the grounding clamp is tight.
- Clean ground clamps and attachment points with wire brush prior to each use.
- Lubricate all moving clamp parts as needed.
- When ground leads are not in use, they shall be coiled and stored on hanging racks away from any equipment or tools that could possibly pinch or damage the ground clamps or cable.
- Immediately repair or replace any grounding cables that do not satisfy all of the inspection requirements.
- Always test any suspect or repaired temporary protective grounds using approved testing set. Test new ground cables after assembly and test used cables after repair.

Ground assemblies are designed to save lives and should be respected and treated like any other life saving equipment!

7.7.9 Voltage Detection Methods and Equipment

A. Voltage detection is the process of sensing voltage on a line to determine whether or not line voltage is present and is used only for conformation of electrical isolation. The test is not a test for induced voltage. It should be noted that induced voltages may cause the tests to falsely indicate an energized circuit. A common method of voltage detection is:

- Tic Tracers are not allowed to be used when identifying or testing energized conductors.
- Voltage indicators may be used in lieu of noisy testers which offer an indication of the voltage levels present. Knowing the voltage level may help the operator determine if the source of the voltage is an induced voltage or an energized conductor.
- If noisy tester indicates that a voltage is present, do not assume it is only an induced voltage / static charge.

B. As with any tool or device, voltage detection tools are subject to failure or malfunction. It is therefore important to "Test the Tester" during the voltage detection procedure by holding it to a known source of power. Some common voltage detectors include:

- Neon Indicator – Used on the end of a live line tool. It will produce a clear visual indication when in the vicinity of an energized circuit. The Neon Indicator is limited in its application and may light up because of induced voltage from a nearby line.
- Hot Horn or Noisy Tester – The noisy tester voltage detector sounds an alarm to alert personnel that voltage is present. Many testers will give a signal despite the type of voltage on the circuit. Other types are equipped with two pitches to differentiate between circuit and electromagnetically induced voltages. These are battery operated devices.

C. Voltage Detection Procedure

- Prior to any work, the team member(s) must confirm that the line or bus has been de-energized and is tagged out.
- The initial activity to take place is the inspection and length determination of the hot stick and noisy tester.
- All proper PPE (reference 7.7.10) must then be applied and inspected.
- The qualified team member must then confirm that the voltage detector is working properly by "testing the tester" to a known energized source. If the voltage detector activates and identifies the energized source as live, then the first confirmation is complete.
- When no known source of power is available in the area to test the tester, a live-dead-live verifier device shall be used as a source of voltage to perform the test.
- The qualified team member will then test the conductor at the location where they will be attaching their grounds. All phases require testing.
- To confirm that the voltage detector has not malfunctioned during the process, the team member must then re-test the voltage detector by holding it next to the known energized source to confirm that the voltage detector is still performing accurately.
- If the voltage detector does not pass either the first or final energized source test, then the team member must replace the malfunctioning voltage detector with a new one and must start the testing procedure over again from the beginning.
- If both tests are accurate and conclusive, the team member may now apply their personal protective grounds.

7.7.10 PPE Requirements Matrix

**CIANBRO SUBSTATION PPE
REQUIREMENT MATRIX**

	Testing for Voltage Detection on Overhead Lines and Buss	Installation of Personal Protective Grounds to Overhead Lines and Buss	Installation of Construction Equipment Grounds	Installation and Splicing of Ground Grid in Existing Yards	General Substation Work	Battery Installation and Removal	Aerial Lift Work
CIANBRO PPE							
Hard Hat	X	X	X	X	X	X	X
E/H Rated Safety Boots	X	X	X	X	X	X	X
Safety Glasses	X	X	X	X	X		X
AR Clothing/Coveralls	X	X	X	X	X	X	X
Voltage Rated Rubber Gloves with Leather Protectors	X	X		X			
AR Balaclava	X	X					
Arc Flash Face Shield or Switching Hood	X	X					
Hot Stick	X	X					
Voltage Detector	X						
Chemical Resistant Suit						X	
Chemical Goggles						X	
Face Shield						X	
Chemical Resistant Rubber Gloves						X	
Harness							X

7.8 Work in Energized Cabinets and Panels

Refer to Cianbro Electrical Safety and Arc Flash Protection policy and procedure (Policy 020) for detailed safety requirements and procedures for working in energized cabinets and panels.

- 7.8.1 Written activity plans must be developed which address the specific work to be accomplished and all electrical hazards associated with it. Activity plans should be based on inspection of the work area and elimination, isolation, or control of identified hazards. A competent supervisor must be assigned to coordinate planning and monitor activities. Activity plans must be communicated with all persons associated with the work, prior to the commencement of the work. The flash protection policy should be followed as close as possible when working on energized panels & equipment, but may be altered if policy procedures create an increased possibility of incident or hazard.
- 7.8.2 Work on energized panels or equipment is prohibited, however necessary when working in substations and utility areas. Whenever possible, electrical equipment must be de-energized, tested, and positively locked-out in accordance with Cianbro's Zero Energy State Policy and Procedure prior to conducting any work on or around it. Energized work will only be done, as an exception, when the work cannot be done with the equipment in an electrically safe working condition. For work on or near live electrical parts 50 volts or more, reference NFPA 70E Article 130.1 "Work Involving Electrical Hazards - Justification for Work". This indicates that if live parts are not placed in electrically safe working condition, the work to be performed shall be considered energized electrical work and shall be performed by written permission only. A completed Cianbro Energized Work Permit is required.
- 7.8.3 Work on live circuits will require using specialized equipment and protective clothing following OSHA, NEC, and NFPA 70E guidelines. Client's requirement shall also be considered.
- 7.8.4 Work on or adjacent to live circuits in confined spaces or enclosed areas with limited space will require the use of protective shields, barriers, or insulating materials to prevent team members from inadvertently touching electrical hazards. Ladders used for access to such areas must be non-conductive. Protective barriers must also be considered if team members are required to work with or handle conductive materials adjacent to the electrical hazards. Adequate lighting must always be provided in areas that contain live electrical parts.
- 7.8.5 There must be a minimum of two Cianbro team members, one being a qualified electrician, working at all times in an Electric Room when panels are open. No team member will ever be left alone. In cases where only two team members are present, both shall be First-Aid/CPR/AED trained.
- 7.8.6 All other work in an Electric Room will be evaluated for electrical hazards by a qualified electrician. If electrical hazards are not found to exist, work may proceed until change in conditions occurs. Should a change occur, work will be stopped and reevaluated by a qualified electrician.
- 7.8.7 When leaving the work area where energized parts are exposed, adequate barricades, guards, or temporary cover will be put in place as to prevent any unqualified team member or passer-by from possible contact with energized parts. If temporary covers are used, they must be of voltage rated non-flammable material. Signage shall be placed on all areas of entry explaining specific hazards and the voltage of each cabinet or panel.

7.9 DC Battery Safety and Handling

7.9.1 There are five major hazards associated with the handling and installation of industrial lead acid batteries.

- Hydrogen Gas
- Sulfuric Acid
- Electric Shock
- Weight of Batteries
- Lead Awareness

Hydrogen gas is the by-product of the batteries charging process and is one of the reasons why exhaust fans are required in control houses. Hydrogen gas is both flammable and explosive if concentrated. Sulfuric acid is a highly corrosive material that will burn both skin and eyes if contact is made. Electrical shock hazards are always present if the terminals are exposed, which they usually are in substation DC systems. Even disconnected terminals have the potential of electrical shock. Accidental shorting of battery terminals can cause severe electrical arcing to nearby personnel. Batteries can be very dense and heavy thus proper lifting techniques must be used to prevent back injury or strain. Battery posts may contain lead. Proper PPE and precautions must be addressed in the Job Hazard Analysis prior to terminal post cleaning operations.

7.9.2 Fire and Explosion Prevention

- Terminal shorts can occur when crossing terminals with a conductive object (tools, pipes, etc.), which can cause explosions. Consider waiting to install terminal connector bars until just prior to batteries being put into service to avoid exposure to a higher series voltage.
- Be sure that the battery bank area has proper ventilation prior to working on or near the batteries to prevent hydrogen gas build-up.
- Neutralize the static buildup prior to working on batteries by contacting the closest grounded surface.
- Tools and other metallic objects must be kept away from uncovered batteries.
- Prevent the possibility of having a spark or flame near the batteries.
- There must be an ABC dry chemical fire extinguisher in charging areas at all times.
- Covering battery banks with high voltage poly is acceptable to guard against inadvertent contact with the battery terminals provided adequate ventilation is maintained under the poly sheet. Otherwise, dangerous levels of hydrogen gas may build up.

7.9.3 Shock Prevention

- Never touch both battery terminals with your bare hands and/or at the same time.
- Be sure to remove all conducting objects from yourself before working near batteries, such as rings, watches, and other jewelry.
- Always wear rubber gloves and insulated tools when working on batteries.
- Always be sure that the battery charger is shut off and locked/tagged out before connecting or disconnecting a battery to prevent possible arcing.
- Barricade battery bank when not working directly on the batteries to prevent accidental contact.

7.9.4 Chemical Burn Prevention

A. Proper PPE required for the installation and removal of batteries includes:

- Chemical splash goggles
- Rubber gloves
- Face shield
- Chemical apron or AR chemical rain suit
- Rubber boots (never tuck pants into boots because spilled acid can pool in the bottom of your boots and burn your feet).

B. There must be an acid neutralizing solution readily available at all times.

C. To prevent accidental spills or drops, use appropriate and sufficient workers/equipment to load and unload batteries.

7.10 General Substation Safety

7.10.1 Typical hazards and considerations for work in substations

A. PCBs (Polychlorinated Biphenyls) Contamination & Safety

- PCBs are organic compounds that were often used in transformers, capacitors, and PVC wire coatings as a dielectric fluid. PCBs were banned in production due to their high toxicity in the 1970's. The compound can easily penetrate skin, PVC, and latex. Kerosene increases the rate that PCBs absorb through the skin. Studies have proven that high intake of PCBs can lead to multiple types of cancer including liver and biliary tract cancer.
- Testing for PCBs should be conducted by an approved testing agency in existing substation yards where old equipment was once in service. Soils and concrete foundations are common sources of contamination.
- PCB exposure symptoms include:
 - Chloracne and rashes
 - Fatigue
 - Headache
 - Cough
 - Unusual skin sores

7.10.2 SF6 Gas in Breakers (Sulfur Hexafluoride)

- A. The stability of the inert SF6 gas causes it to be a very effective electrical insulator and flash extinguisher. These characteristics are why it is used in high voltage circuit breakers. OSHA identifies SF6 gas as having no adverse effects when inhaled in the air at a Threshold Limit Value of 1,000 ppm. The gas is identified through the EPA as a greenhouse gas that can produce 23,900 times the global warming potential of an equal volume of Carbon Dioxide. SF6 is five times heavier than air and is both colorless and odorless. Due to its density, SF6 will displace air and can collect in cable trenches and other confined areas if not properly ventilated. Even though pure SF6 gas is non-toxic, its decomposed by-products, sulfur oxide and metal fluorides can be very poisonous. Both sulfur oxide and metal fluorides are the resulting by-products of electrical arcs within the breakers. The metal fluorides usually take the form of a fine gray powder and have an odor resembling rotten eggs. Removal and installation of SF6 gas from breakers should be performed by a qualified company certified to handle the gas.
- B. Safe work procedures and emergency procedures shall be identified in the activity plan when potential for exposure to SF6 gas exists.
- C. Systems that are charged with pressurized SF6 gas present an explosive/projectile hazard if contact damage occurs. If equipment is operated near charged systems, or potential damage to systems due to dropped objects may occur, it shall be requested that systems are discharged of pressure, or special activity planning and mitigating measures will be employed to eliminate the hazard.
- D. The handling, storage, and shipping of SF6 cylinders will be in accordance with Cianbro Safety Policy and Procedure 029 Handling and Storage of Compressed Gases. The following highlight the major requirements:
 - SF6 cylinders are commonly shipped to the jobsite on pallets and positioned horizontally during transit (this is allowed according to DOT regulations).
 - When SF6 cylinders arrive onsite, they shall be securely stored in an upright (vertical) position at all times by storage racks, bottle carts, chains, or other sturdy non-combustible hold down devices to prevent cylinders from being knocked over while in storage or in use
 - When SF6 cylinders are handled or moved on the worksite, regulators shall be removed and valves shall be closed and covered by protective caps. They shall be transported in storage racks, bottle carts, or on rack trucks and shall be secured in an upright position.
 - When SF6 cylinders are to be shipped back to vendors, the valves shall be closed and covered by protective caps, palletized horizontally, and banded. Pallets of cylinders shall be located in an area where they are protected from accidental contact from vehicles or other construction equipment.

7.10.3 Proper Flagging and Barricades in Energized Yards

- When identifying and barricading hazardous/energized areas in substations, the use of flagging instead of standard danger/caution tape is required. Flagging is a slightly heavier material than standard danger tape and has a lower probability of breaking and being carried by the wind into energized equipment or conductors. If open trenches and excavations are left over night, highly visible or reflective barricades must be installed.
- Open cable trenches shall be adequately barricaded.



Example of Hard Barricade



7.10.4 Working Overhead

- High overhead work is a common activity in substation construction and can present extreme danger to ground workers who may be susceptible to falling debris and equipment. Team members on the ground must stay clear of all aerial lift work. Barriers shall be erected to prevent workers from accidentally passing through areas where overhead work is taking place and it is recommended that a ground-level spotter be present to keep team members away from fall-zone areas.

7.10.5 Carrying Materials in Energized Yards

- Due to the prevalence of energized overhead lines and equipment in substations and switch yards, it is required that all material being hand carried through an energized yard must be at waist level or lower. Longer items such as rebar, conduit, and lumber create a greater risk of coming in contact with energized parts. It is suggested that materials be carried below waist level in de-energized substations as well, as this will reinforce proper handling practices in all substations.

7.10.6 Crane and Hoisting Operations in Energized Yards

- Due to frequent space restrictions as well as energized substation equipment, the implementation of Cianbro's Crane Safety Policy (No. 028) and Safe Rigging Operations Policy (No. 008) is essential. Both Cianbro qualified riggers and

crane/boom truck operators must meet the General, as well as the Non-Construction work requirements for substation access. Subcontracted crane companies must have established safety policies and plans, as well as meet the Subcontractor Training Requirements referenced in section 7.2.1. All cranes and boom trucks operating in energized substations must adhere to the grounding procedure as noted in section 7.7.6. Grounds must also be applied if the crane is located outside the fence boundary and is either in proximity to energized lines or has its boom within the limits of the energized substation or other energized power lines.

7.10.7 Asbestos and Lead Paint in Existing Control Houses

- A common threat that exists in many older control houses is Asbestos and Lead Paint. Asbestos is most frequently found in ceiling and floor tiles. The utility company should have signage within the control house identifying whether or not asbestos is present. In the case that asbestos is present the team members must follow Cianbro's Asbestos Policy (No. 049). It is in the best interest of team member to minimize any contact or removal of ceiling and floor tiles, even if they are deemed asbestos free.
- Lead paint is another threat that must be foreseen in many aged substations. If the existence of lead paint is identified in an area Cianbro will be working, the team must refer and abide to Cianbro's Workplace Protection Program for Lead and Other Heavy Metals Policy (No. 006).

7.10.8 Protection of Gas Bottles and Containers

- Gas bottles used during substation construction shall be either contained in a bottle cart/station while on site or tied off to a solid structure, such as structural steel. Also, all fuel containers must be stored in a fuel cabinet or double lined tank when not in use. With the amount of equipment traffic and welding required, it is imperative to keep gas and fuels from being struck and away from possible sparking.

7.10.9 Demolition in Existing Yards

- Demolition in existing yards must be treated in the same manner as construction; with adequate planning, grounding procedures, and the same work practices identified throughout Cianbro's Substation Safety Policy. In the event that foundations are removed or chipped below ground, there is always the threat of PCBs and Silica Dust. Silica is a fine particulate dust from quartz rock that is known to cause a progressive lung injury over a long term. If any concrete demo is required, team members must refer to and follow Cianbro's Concrete Demolition Safety Bulletin and Workplace Crystalline Silica Protection Program.

7.10.10 Fall Hazards and Tie-off Rules

- Since most mechanical work is completed in the air, either on a fiberglass step ladder or grounded aerial lift, fall hazards are always present. All team members are required to apply Cianbro's Fall Protection Program (No. 011) when either working in the air or near excavations. Occupants of a lift whose basket is not in contact with or resting upon the ground shall be in compliance with 100% tie off rules at all times. When in an aerial lift, all team members must tie off to the manufacturer's tie-off point or mid to lower rail if a tie-off point does not exist. When occupying a lift, TM's will use either a 4' lanyard or a retractable fall block. TM's will utilize a retractable fall block if mandated by client.
- There are minimal, if any, approved tie-off points on top of a transformer. When it is necessary to work atop a transformer, a manufacturers supplied "may pole" should be utilized or, if possible, fall blocks should be positioned directly above the transformer attached to an adequate anchorage point.
- Team members using a ladder over 6' must be 100% tied off unless they are climbing or descending facing the ladder with both hands free to securely grip the ladder rungs. During winter months, it is necessary to position your step ladder in an area that is free of ice or is well sanded. Also, it is essential to confirm that the ladder steps are clear of ice or snow to prevent any slipping.

- 7.10.11 Insulated Tools and Non-Metallic Tape Measures
- To fully comply with OSHA 1910.333 (c)(2) and NFPA 70E 2004, insulated hand tools must be used when conducting work in live cabinets and panels, as well as battery installations. All hand tools must comply with IEC 900 and ASTM F1505-01 Standards for Insulated Hand Tools. With the amount of field measuring done in live substations, non-metallic tape measures shall be required in any location where safe working distances might be compromised with a fully extended steel tape measure.
- 7.10.12 Broken Insulator Glass
- When broken insulator glass must be disposed of, all team members must wear Kevlar or cut resistant gloves while handling. All glass must be placed in a glass specific waste container.
- 7.10.13 Equipment Spotters
- Equipment spotters should be used to assist operators in congested substations or when the following conditions exist:
 - When operators can not see 360 degree around equipment.
 - When excavating around buried electrical lines.
 - When excavating around buried gas lines and utilities.
 - When operator is working within the qualified and non-qualified approach distances to live substation parts and the equipment is in motion.
- 7.10.14 A spotter is responsible for meeting the following requirements:
- Must wear a bright orange or lime vest or jacket if working near moving vehicles or heavy equipment. (Wear reflectorized clothing at night and use a flashlight.)
 - A spotter has authority to stop work if any unsafe condition arises.
 - When assigned as a spotter that is your only responsibility until the assigned task is complete.
 - Always maintain visual contact with the equipment operator to be sure you are seen.
 - Operator and spotter shall conduct an area walk around to identify possible hazards prior to beginning the task.
 - Establish eye contact with the equipment operator before backing them up. Keep operator in sight at all times while backing. If you lose sight of the operator, STOP so they can determine your location.
 - Agree on clear, standard signals, easily understood by both spotter and operator. (Radio communication, audio communication air horn, or hand signals.)
 - If a clear signal is not given, understood, and acknowledged nothing should move.
 - Stay alert at all times.
 - Keep a safe distance.
 - Keep off the equipment unless authorized.
 - Watch out for shifting or unstable loads.
 - Watch out for other equipment in the work area.
 - If spotter needs to leave area, equipment operator must stop operation until they return.
- 7.10.15 Utility and Pocket Knife Safety
- A. Utility and Pocket Knives are useful and safe tools in substation construction when utilized properly. Therefore, when proper planning, training, and documentation through daily activity plans are implemented for the direct use of utility knives, team members may have the option of using a utility/pocket knife for specific functions. These functions include; stripping/prepping cables; opening packages; and scoring/markings for measurement. The following items need to be addressed prior to and during the use of utility knives:
- Is the knife blade appropriate for the job?
 - Is the handle large enough to provide a secure grip?
 - Always cut in a motion away from the body, and away from other people and hazards.

- Keep other hand, fingers, and thumbs out of the way when cutting.
- Wear cut resistant gloves and cut resistant sleeves when stripping cable or performing other repetitive tasks.
- Utility and pocket knives shall not be used to cut plastic tie wraps, tie wire, or other similar materials. The correct tool for the job shall be selected including side cutters or metal snips.
- Only extend out the minimum amount of blade necessary for the task.
- Knives shall be folded / retracted and stowed after each cut / use. Do not set the tool down without first retracting all exposed sharp edges or blades.

7.10.16 Cable Stripping Safety

- Before selecting a utility knife for stripping cable, consider all available stripping tools designed specifically for the task.
- The best method for stripping back cable sheathing is to use the string installed inside the cable by the manufacture.
- Have the supervisor review and approve your method of stripping.

7.10.17 Working on Substation Equipment and Pressure Vessels

- It is standard practice not to drill, weld, cut or otherwise alter any manufactured equipment particularly, pressurized or vacuum filled equipment, without specific approval from Owner, Owners Engineer, or Equipment Manufacturer. If authorization is granted, specific instruction shall be provided detailing the nature of the alteration and the work shall be addressed in the daily activity plan. When possible other less invasive methods of attaching conduits and accessories to equipment shall be considered such as welded studs, epoxy adhesives, edge clamps, beam clamps, and other types of fasteners.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 NFPA 70E Standard for Electrical Safety in the Workplace – 2009 Edition
- 9.2 OSHA 1910.269 Regulations for Electric Power Generation, Transmission, and Distribution

Policy Number: 052**Authorized By:** Michael W. Bennett**Title:** Health & Safety Recognition Policy**Effective Date:** 09/14/09Page 1 of 4

1 Status

1.1 Update of existing policy, effective 02/05/15.

2 Purpose

2.1 To provide positive recognition and acknowledge a team or team member's individual effort for displaying healthy & safe working behaviors.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 Personal Safe Hours: Accrue when a team member is physically at work. Safe hours are work hours only and do not include time off with pay.

4.2 Project/Milestones: A project has the discretion to celebrate other milestones, not necessarily a health & safety milestone. These milestones are paid for by the project.

4.3 Project Safe Hours: Total project safe hours since the project's last work recordable injury.

4.4 Project Safe Days: Total # of consecutive days passed since the last recordable injury.

4.5 Health & Safety Luncheon Celebrations: Recognition for meeting designated health & safety milestone.

4.6 Leading Safety Indicators: A measured safety action that is proactive in identifying exposures and risks prior to incidents occurring.

4.7 Health & Safety Incentives: Tangible gifts under \$25 per team member in recognition of meeting or exceeding leading indicator goals such as:

1. CAPP Observation Rate: Minimum goal rate of 24.
2. # of Jobsite audits performed with completed action items.
3. Established Health & Wellness Goals met or exceeded.

4.8 Time Off with Pay: Includes vacation and holiday.

4.9 Work Hours: Work hours do not include time off with pay. A team member and/or jobsite accumulate through their service work hours; consisting of overtime and regular work hours.

5 Policy

- 5.1 To recognize and reward team members and project teams for meeting health & safety milestones.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy.
- 6.2 Cianbro Human Resources is responsible for verifying safety milestone celebrations and maintaining this document.

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7.1 Personal Safe Hours

7.1.1 Commencing from the date of hire, a team member will start to accumulate their own personal safe hours. Personal safe hours follow each team member from site to site and are a product of payroll. Personal safe hours are lost when a team member has a coaching/safety counseling report that includes time off without pay. In those instances, hours are set back to zero from the date of the incident. The following day personal safe hours begin to accumulate again. At the beginning of the year safe hour decals are issued in 5,000 hour increments. *Additional consideration may be applied by the vice president of health, safety, environmental and human resources and Business Unit Leader.

7.2 Safety Luncheon Celebrations:

7.2.1 Health & Safety Luncheons may be provided for reaching the following Health & Safety milestones:

- Project completion without a recordable injury.
- 12 consecutive months without a recordable injury.
- 200,000 hours without a recordable injury.
- Met health & wellness goals as established by site, Business Unit, and/or Corporate.

7.2.2 Each project is responsible for:

- Maintaining an accurate, current total of work hours since the start of a project or since the last recordable injury.
- Notifying corporate safety when a safety milestone has been reached.

7.3 Project gifts

7.3.1 Project gifts for health & safety celebrations/milestones shall be authorized by the Business Unit Leader.

7.4 Menus

7.4.1 Eating healthy helps us stay physically fit, feel better, maintain a healthy weight and have fewer illnesses. Cianbro is committed to providing a healthy work environment and supporting team members in their daily activities to live healthier. Therefore, all company provided meals are required to support this goal.

- Healthy food choices include grilled chicken, baked potato, tossed salad, fruit and angel food cake.
- Healthy beverage choices include water, coffee, milk, tea, low calorie sports drinks, low sodium and low sugar juices, etc.

Reference Cianbro.net for preferred healthy menu choices. In the search box, search for "menu".

8 Budget / Approval Process

- 8.1 Health & Safety Luncheon Celebrations are approved through the Business Unit Leader prior to the celebration.
- 8.2 Gifts should not exceed \$25 in value per team member and must be a tangible item.
- 8.3 Cash incentives are not allowed. This includes gift certificates, gas cards, or any other type of debit/pre-paid card.
- 8.4 The cost associated with the milestone celebration (luncheons & tangible gifts) will be at the expense of the celebrating entity.
- 8.5 The cost associated with providing a healthy lunch celebration shall not exceed \$15.00 per person.
- 8.6 Sr. Managers shall be informed in advance of any scheduled health & safety celebration.

9 Related Documents

- 9.1 References
 - Team Member Handbook
 - Safety Health Overview Manual
 - Wellness – Suggested menu for Cianbro provided meals

Policy Number: 053

Authorized By: Michael W. Bennett

Title: Work Activity Planning

Effective Date: 03/22/10

Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 03/05/15.

2 Purpose

- 2.1 To ensure that a sufficient and proper level of planning is done for all work activities for which Cianbro is responsible for in order to achieve optimum results in the areas of safety, quality, productivity, and customer satisfaction.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Competent Person:** *Under the OSHA definition: Expertise to recognize hazards, and have the knowledge and authority to make corrections.*
These are people named by Cianbro as competent in specific hazard categories and can help identify the hazards and develop safe ways to eliminate or control them. They are a resource for supervisors to use and they have specific duties as a competent person related to the task. We need to make sure all team members they know when they are listed as a competent person on any plan.
- 4.2 **Daily Activity Plan:** Daily plans are used to supplement major activity plans or are done when they will be sufficient for a supervisor and crew to “get their arms around the work”. Daily plans are also used to plan the portion of the work that will be done by a crew in a day or less, the task(s) are relatively straightforward, the hazards are relatively predictable and hazard control is routine.
- 4.3 **Major Activity Plan:** Major activity plans are typically required for activities that take several days to complete. The work involves interaction or coordination between crews or with outsiders, presents high potential for risk or injury, is complicated, difficult, or unusual for Cianbro to perform.

5 Policy

- 5.1 Work activity planning is an integral part of Cianbro’s safety program and it has a direct impact on our safety performance, quality, production, profitability, and customer satisfaction. If done, and done effectively, it can have the biggest impact on our continued success in these areas. With this in mind, all Cianbro work activities require a written activity plan.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site or in the Department is responsible for the implementation of this policy.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Developing the Major Activity Plan

7.1.1 The activity planning process for any project starts with the estimating team. In order to submit an accurate bid, our safety policies must be considered, planned for, and estimated. The estimator will formulate the expected sequence of events; look at equipment needs, subcontractor procurement, environmental considerations, special client requirements, etc. It is imperative that the planning done by the estimator(s) is passed on to the project management team assigned to the project during the turn-over meeting.

7.1.2 The project management team, with the input from the estimating team, must then look at the full scope of the project and identify which activities will warrant a “major” activity plan. In general, each division or discipline will warrant a major plan but there may be other activities that, based on work hours, duration, specific hazards, or complexity will require its own plan. All activities that are earmarked as needing a major activity plan will be identified and discussed at the Project Management Plan (PMP) review. The same process of identifying activities that warrant a major plan must also be utilized at ongoing industrial accounts and for projects that may be too small to warrant a PMP.

7.1.3 Major activity plans must be initiated by the discipline superintendent or project leader with help from the project engineer (where applicable). S/he will fill in, at a minimum, the scope of work, budget, work schedule, and safety and production goals. S/he may also have input regarding specific safety hazards and how they will be handled. The plan will then be handed off to the supervisor in charge of the work for completion. Cianbro’s 6 “pillars” must be considered in all major activity plans including;

- A. Health and Safety
 - Hazard identification
 - Hazard elimination
 - Hazard control
 - Continuous planning
- B. People
 - Crafts needed
 - Number of team members
 - Set expectations
 - Special licenses
 - Training needs
- C. Production and Quality
 - Production rate/goals
 - Budgeted work hours
 - Maintain schedule
 - QA/QC
 - Minimize re-work

- D. Customer
 - Special client requirements
 - Client expectations communicated
 - Provide what was specified
 - Communicate issues to client in a timely fashion

- E. Financial
 - Manage crew size
 - Manage tools and equipment
 - Update quantities

- F. Culture
 - Leadership/Trust
 - Can-do spirit
 - Positive attitude
 - Lead by example

A well planned job is a safe and a productive job. Safety and productivity have a direct correlation that is maximized through good planning.

7.1.4 **The supervisor must be given adequate time to complete the activity plan and do a thorough job on it prior to the start of the activity.** The supervisor will engage the safety specialist whenever possible for their input in the hazard identification and solutions section of the plan. Once the plan is complete, it must be reviewed and signed off by the discipline superintendent and safety specialist prior to it being reviewed with the crew.

7.2 Developing the Daily Activity Plan

7.2.1 The intent of the daily activity plan is for it to be a living document. The major plan is expected to address the easily identifiable hazards associated with the work and the daily plan is intended to be used as a supplement that addresses unforeseen or additional hazards that arise on subsequent days. Regardless of the quality of a major plan, there are always hazards that are inherent to a specific area or may be present one day and not the next (ie. weather conditions, activities adjacent to our work, chemicals, traffic, etc). These additional hazards must be evaluated and prioritized based on severity and risk, then addressed and documented on the daily activity plan. With this in mind, a new plan must be developed each day even when work activities appear to be repetitive. Photocopying of the hazard analysis portion of the daily activity plan is not acceptable. To maximize the planning efforts, the daily activity plan should be completed in the actual work area. At a minimum, a formal walkthrough of the intended work area(s) must be done by the supervisor focusing on potential hazards. This process is the only way to adequately identify the hazards involved with the scope of work. We have had success on some jobs implementing a process that asks team members to do a formal, documented hazard analysis of their work area. This "Hazard Hunt" process is encouraged, but does not replace the hazard analysis required by the supervisor. In any case, all team members must be actively involved in the hazard identification process. A quality crew meeting at the end of the shift may also help to identify additional hazards and solutions that can be captured and discussed using the following day's activity plan process.

7.2.2 The daily activity plan must include specific work steps, hazards associated with those work steps, and specific hazard controls for each identified hazard. Eliminate the hazard if possible, then use engineering and administrative controls to mitigate the hazard. PPE must be identified based on the hazard but is the last resort for hazard control.

7.3 Stop Work Obligation

7.3.1 All team members have the authority and obligation to stop any task or operation where concerns or questions regarding the control of safety risk exist. They have both the

authority and obligation to stop work, if there is a question or concern for the safety of the team members, environment or equipment involved.

- 7.3.2 As part of the site orientation, you must review this Stop Work Authority with all team members and subcontractors coming onto site before they start work. The training must be documented on the orientation sign off including the team member name, the dates of training and that the stop work authority and obligation was covered.
- 7.3.3 Team members are responsible to initiate a Stop Work Intervention any time the exposure to hazards is different than the activity plan and the management team is responsible to create a culture where Stop Work Authority is exercised freely. When an unsafe condition is identified the Stop Work Intervention will be initiated, coordinated through the supervisor, initiated in a positive manner, notify all affected team members and supervision of the stop work issue, correct the issue, and resume work when safe to do so. The team must pause and reevaluate the activity, redo the activity plan and review it with all affected team members.
- 7.3.4 If work is stopped, then the work will not resume until all stop work issues and concerns have been adequately addressed. No form of retribution or intimidation directed at any individual or subcontractor for exercising their right exercise stop work authority will be tolerated by Cianbro.
- 7.3.5 If a team member feels the safety issue is still not adequately addressed then the appropriate superintendent and the safety specialist will be contacted to determine how to safely complete the task.
- 7.3.6 All Stop Work Interventions that cannot be managed at the supervisor and crew level shall be documented for lessons learned and corrective measures to be put into place. Stop Work reports shall be reviewed by supervision order to measure participation, determine quality of interventions and follow-up, trend common issues, identify opportunities for improvement, and facilitate sharing of lessons learned.
- 7.3.7 It is the desired outcome of any Stop Work Intervention that the identified safety concern(s) have been addressed to the satisfaction of all involved persons prior to the resumption of work. The issue is expected to be resolved at the lowest level possible. Most issues can be adequately resolved in a timely manner at the crew level. When necessary the issue will be escalated until it is resolved.

7.4 Communicating the Plans

- 7.4.1 The only effective way to communicate a written activity plan is verbally. Verbal reviews of all plans are expected to be completed prior to starting each activity. With that said, an area must be identified where the plan can be reviewed and heard by all team members on the crew. Whether it is a major, daily, or verbal activity plan being reviewed, each individual should leave the meeting with a clear understanding of their assignment, the hazards associated with it, and the specific plan that will be implemented to address each hazard. Input from the team must be encouraged and welcomed. A collaborative effort between the supervisor and the crew will result in the best plan. Once the review is complete and additions have been made, the crew members are required to sign any written plan. Their signature acknowledges that:
 - The plan has been explained to them and they understand their role
 - They accept accountability for following the plan
 - They have reviewed any work modifications with their supervisor and/or any other reason they may be unable to perform the activity safely (medications, allergies, illness, physical limitations, etc.).
- 7.4.2 There are many obstacles that make it a challenge to ensure that each team member has reviewed the activity plan associated with their assignment. A few examples of these obstacles and how they need to be managed include;
 - When a team member is assigned to a different supervisor temporarily, that supervisor must, at a minimum, review the relevant daily activity plan with the team

member and insure that they understand their assignment, the hazards involved, and how they are to be addressed.

- When a team member is assigned to a different supervisor permanently, that supervisor must review the relevant major activity plan (if different) and the daily activity plan with the team member and insure that they understand their assignment, the hazards involved, and how they are to be addressed.
- When a team member is new to a project site, their supervisor must, at a minimum, review the relevant major activity plan with the team member and insure that they understand their assignment, the hazards involved, and how they are to be addressed.
- Language barriers are often present. Management should ensure that the plan is clearly communicated and understood by the entire team.

Please note: In all of the above situations the supervisor must always verify if the TM has any work mods or if there is any reason they may be unable to perform the activity safely (medications, allergies, illness, physical limitations, etc.).

7.5 Revisiting and Modifying the Plan

- 7.5.1 Every activity plan must be revisited on a regular basis to ensure that it accurately reflects the work at hand and addresses the hazards and solutions associated with it. Major activity plans must be revisited at the end of the first full week of the activity and again at the 3 month or 20% completion review milestone (whichever comes first) and any additional relevant information added. The updated plan must be reviewed with all team members within one week of these milestones. Daily activity plans must remain a working document with any relevant changes or verbal activity plans reviewed and added at scheduled crew meetings after morning break, after lunch, and at the end of the work day. The initial plan for the day very seldom remains accurate due to changes in scope, or additional hazards that are encountered. History has shown us that most incidents are due to these changes and our lack of planning for them. Revisiting the plan with the crew and engaging them multiple times per day will give us the best chance for addressing these issues upstream.

7.6 Review and Feedback Process

- 7.6.1 To best identify areas for improvement, there must be an effective process for reviewing and giving feedback to supervisors regarding their activity planning efforts. If we are not communicating areas for improvement, we are telling them that what they are doing is adequate and acceptable. Site management must participate in this activity planning review process. The process must evaluate the quality of the written document, how well it is communicated to the crew orally, and include daily spot checks in the field for activities actually going on versus what is written in the activity plan.
- 7.6.2 Each supervisor's activity planning capabilities must be discussed specifically during their annual Team Member Profile (T.M.P.) process. Areas for improvement, if any, must be identified and communicated to the supervisor and an action plan and measurable goals must be initiated. Periodic follow-up will be required to insure progress toward the goal(s).

7.7 Qualifications and Training

- 7.7.1 To be able to effectively complete, communicate, and manage a meaningful activity plan, the supervisor must;
- Believe in and support the intent of the process.
 - Read and write at an adequate level.
 - Know the scope of work and how to accomplish it safely and productively.
 - Be able to build and communicate an effective plan.
 - Be able to identify when additional planning is needed.
 - Be able to mentor and coach his/her crew for success as the plan changes.

- Know Cianbro policies.
- Be able to juggle safety requirements, quality, productivity, crew performance, and the customer while being able to make good, sound decisions in relationship to all of them.

7.7.2 If through the review and feedback process at the site or during the TMP process, a specific area for improvement regarding activity planning is identified, the appropriate support must be given to the supervisor. Whether it is in the form of training, coaching, or formal mentoring, the supervisor must be given the opportunity to improve and succeed. It must be understood that not every team member that excels at their craft is capable of being a good supervisor. On the other hand, some of our best supervisors and leaders may not come from the top of their craft.

7.7.3 All team members must receive training in hazard identification either as part of the site orientation or during safety meetings. Training on hazard hunt cards, training on how to do activity plans, and training on CAPP observation process all meet this requirement

7.8 Subcontractor Compliance

7.8.1 Subcontractors are required to follow all Cianbro policies. Activity planning is an integral piece of our safety program and an effective tool for insuring both compliance and a safe jobsite. Subcontractors must actively identify hazards and controls associated with their scope of work. Whether the subcontractor uses the Cianbro format or elects to use their own document, formal written activity planning is required. The same method for review and feedback by Cianbro supervision must also be implemented with subcontractor activity plans.

7.9 Client Requirements

7.9.1 Clients who have their own longstanding and proven planning methods will require that Cianbro use their forms and process. When applicable, the client's process must be evaluated, deemed comparable/adequate, and must be approved and agreed to by the Corporate Safety Manager.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

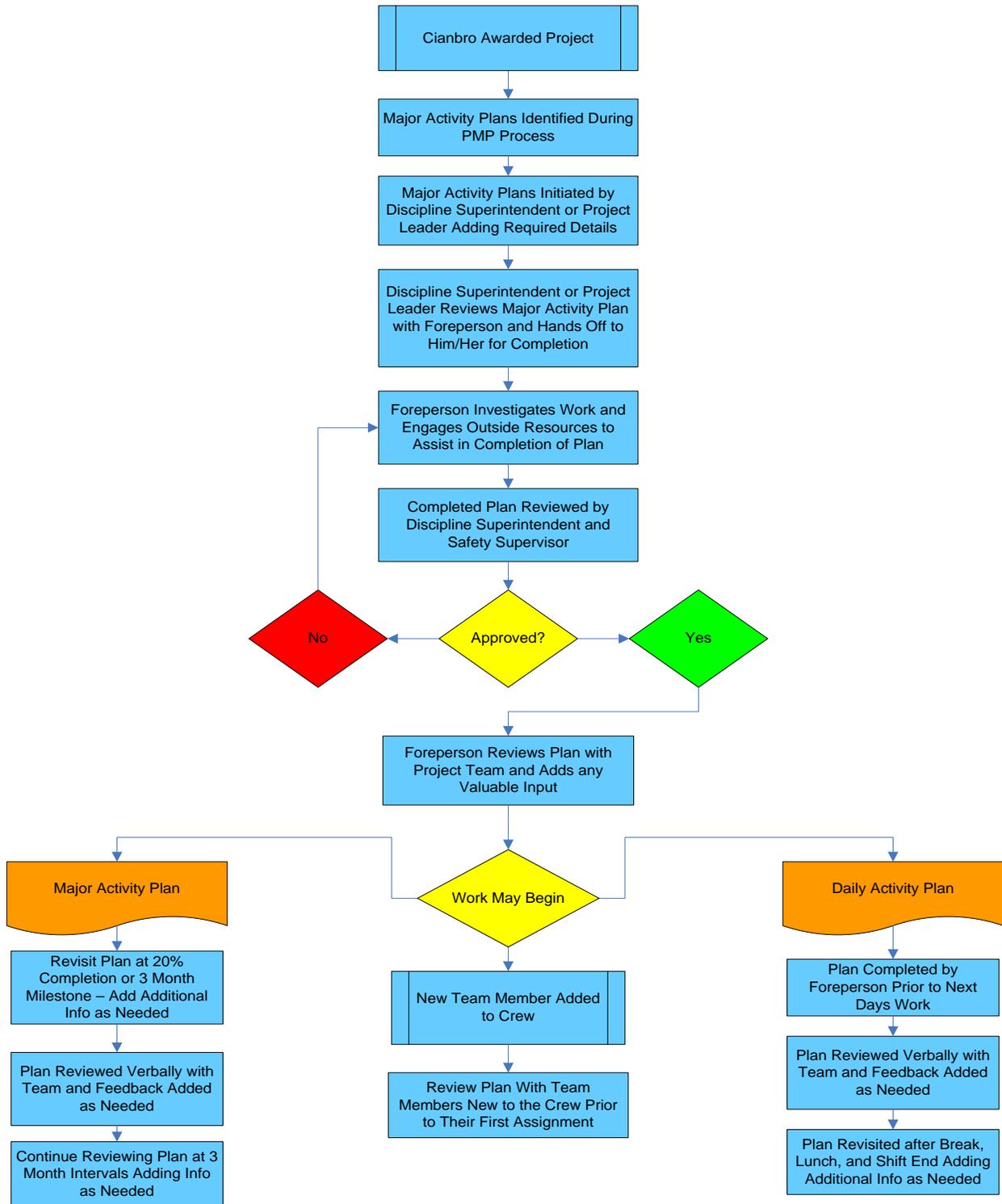
9 Related Documents

9.1 See attachment.

9.2 Document available on Cianbro.net>Standard Operating Procedures – on the SOP.

Heavy Haul Transportation Activity Plan Supplement	SD1059
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Activity Planning Flowchart



Policy Number: 054

Authorized By: Michael W. Bennett

Title: Airless Spraying Operations Program

Effective Date: 03/02/10

Page 1 of 9

1 Status

- 1.1 Update of existing policy effective 06/04/15.

2 Purpose

- 2.1 To provide guidelines for the safe operation of airless spraying equipment and to identify and eliminate the hazards associated with these tasks.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 **Airless Spraying:** An airless sprayer uses air or an electrically run hydraulic pump to move paint from a bucket or container, through a tube, into a high-pressure hose, to a spray gun and finally to the surface.

An airless sprayer is made from several components which are:

- **Pump / Fluid Section**
This is what moves and pressurizes the material to be sprayed. Airless pumps are made of hardened, heavy-duty steel so they can create the high pressure needed to atomize paints.
- **Motor & Drive Train**
Cianbro uses both air and electric powered pumps.
- **Gun, Hose & Tip**
The hose, gun & spray tip get the pressurized liquid onto the surface.
- **Pressure Control**
There are two main types of pressure controls; electronic and mechanical. A majority of Cianbro's airless spraying equipment utilizes a mechanical pressure regulator valve.

- 4.2 **Atomize:** When pressure in the gun nozzle breaks up the paint and solvents into fine particles.

- 4.3 **Competent Painter:** A team member who, through training and experience, has acquired and demonstrated the appropriate skills and behaviors. A competent painter will have the knowledge to identify hazards within their work environments for themselves and fellow team members. A competent painter has the authorization and the responsibility to stop work and eliminate hazards when identified. Competent painters will be identified by the site management team.

- 4.4 **Dermal:** Pertaining to the skin.

- 4.5 **Flow:** The ability of a coating to level out and spread into a smooth film.

- 4.6 **Grounded:** A conducting connection between an electric circuit or equipment and the earth or some other conducting body.

- 4.7 **Pressure:** The amount of force exerted evenly on a given surface area, typically reported in pounds per square inch.

- 4.8 Skin Microflora: Living microorganisms that are so small that they can be seen only with a microscope and that maintain a more or less constant presence in a particular area, e.g. the pharynx or the rumen, includes bacteria, viruses, protozoa and fungi.
- 4.9 Static Electricity: Electric discharge resulting from the accumulation of electric charge on an insulated body.
- 4.10 Thinner: Volatile liquid used to adjust viscosity or to modify other properties of paint. Thinner is also used to clean.
- 4.11 Toxicity: Is a concern with some exotic coatings injected directly into the bloodstream.

5 Policy

- 5.1 The project's top management is responsible for the airless spraying operations. Management shall implement and adhere to this policy and all other Cianbro policies and procedures relating to this operation.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

7 Airless Spraying Operations Program Index

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7.1 Procedure/Best Practices

- 7.1.1 Obtain and review the MSDS for the paints and solvents you will be using and follow any specific recommendations for personal protective equipment above and beyond Cianbro's own requirements.
- 7.1.2 All painting operations must be done in a well ventilated area.
- 7.1.3 When spraying in a spray booth (even if a temporary one) the booth must be properly maintained, including regular cleaning of the filters and overspray.
- 7.1.4 Respirator selection and use will be based on a hazard assessment of the components in the paint and the protection factors required. (Follow the site specific respiratory protection plan).
- 7.1.5 Protective clothing must be provided to prevent dermal exposure. This includes coveralls/Tyvex, head socks, gloves and boot covers at a minimal.
- 7.1.6 Contaminated PPE must be disposed of (or commercially laundered) immediately.
- 7.1.7 All food and/or drinks will be kept separate from any painting applications.
- 7.1.8 Select the appropriate spray equipment based on pressure and flow requirements of the application.
- 7.1.9 Check all equipment regularly and repair or replace worn or damaged parts before use.
- 7.1.10 Equipment and accessories must be used within their rated capacities. (Do not exceed the maximum working pressure of any component of the system.)
- 7.1.11 Use only water based cleansers that are meant for personal cleanup to remove paint from hands or skin.
- 7.1.12 All electrical equipment and tools used in spraying areas must have appropriate electrical rating and must be grounded.
- 7.1.13 Ergonomics Spraying can require holding static positions for long periods of time and also involves repetitive motions. Remind sprayers to relax when spraying and stretch frequently.
- 7.1.14 Never use an airless sprayer without the tip guard in place.
- 7.1.15 Never repair high pressure hoses. Destroy damaged hose and replace with new hose.
- 7.1.16 Never leave an airless pump unattended without first shutting off the pump, triggering the gun to release all pressure and setting the trigger lock on the gun in the "locked" position.

- 7.1.17 Always ensure that the power switch is “off” before plugging in the electrical units.
- 7.1.18 Check all connections and fittings for tightness before operating the unit.
- 7.1.19 Observe good housekeeping; keep spray area clear of obstructions as visibility while spraying can be limited.

7.2 Specific Hazards

7.2.1 Fire and Explosion

Fires and explosion occur when there is an ignition source combined with flammable vapors and oxygen. It is imperative to our safety to eliminate all ignition sources from the spraying area. Possible ignition sources are:

- Electrical switches or motor
- Lighting/heating
- Open Flames/sparks
- Static electricity

Static electricity may build up when fluids flow through pumps, hoses, and sprayers. In these situations ungrounded objects can accumulate a charge and subsequently a discharge.

To prevent fire and explosion the following precautions should be taken:

- Install and use proper ventilation.
- Remove or extinguish all ignition sources.

Require grounding of all equipment, objects and team members to prevent electrostatic discharge. Proper grounding of the airless system safely dissipates this charge.

Grounding should be to a designated ground source if possible (i.e. grounding rod, copper cold water pipes, or building steel). When grounding ensure to:

- Remove all dirt, rust, or corrosion from areas where connections are to be made.
- Use connectors that are strong enough for the job.
- Connect metal to metal.
- Protect ground clamps and fittings from physical damage.

7.2.2 Skin Injection

Airless spray guns atomize by hydraulic pressure, forcing paint through a very small orifice (0.011 to 0.023in) in the nozzle. Paint is delivered from high pressure pumps between 2000 and 5000psi. Spray particles retain enough velocity to travel into the skin.

Injection in the skin is a serious traumatic injury. **IT IS IMPORTANT TO TREAT THE INJURY SURGICALLY AS SOON AS POSSIBLE.** Do not delay treatment to research toxicity. The seriousness of the wound depends on where the injury is on the body, whether the substance hit something on its way in and deflected causing more damage, and many other variables including skin micro flora residing in the paint or gun which are blasted onto the wound. The following precautions should be taken to avoid injection:

- Never use an airless spray gun without a safety tip guard or if any safety devices are not working or have been removed. (Trigger lock, diffuser, etc.).
- Always have trigger lock on when cleaning/changing tip, adjusting swivel and when depressurizing the airless system to prevent air injection.
- Always relieve pressure from air line before disconnecting hoses from pump or gun.
- Always make sure that all connections on air line are properly secured to prevent them from separating while under pressure.
- Always make sure that all personnel are out of line of fire before using the airless spray gun.
- Never point the airless spray gun at any other person or towards yourself.

- Make sure you know where your hands and fingers are at all times in relations to the tip of the airless spray gun.
- Always depressurize your gun and lines before making any disconnections. (Use the dump valves on the pump.) Secure the gun and the airlines to avoid “whip” effect.

7.2.3 Chemical Exposures/Toxicity

Toxicity is a potential hazard when the work environment exposes team members to:

- Fumes from coating materials or fluids.
- Gas engine exhaust fumes.
- Toxic fluid that contacts skin, nose, mouth or eyes.

Whenever chemical exposures are present; review product MSDS sheets and follow the proper procedures to eliminate or protect from exposure hazards.

7.2.4 Pinch Points:

Moving parts, such as the priming piston, can pinch or amputate your fingers. To prevent injury from moving parts:

- Never operate equipment with guards or other protective devices removed.
- Properly use bleed type shutoff valves.
- Keep clear of all moving parts when starting or operating the pump.
- Depressurize all components before doing and service/maintenance.
- Identify pinch points when working from elevated work platforms (baskets) and keep team members hands/arms clear from these areas.

7.3 Training

Training for airless sprayers will be done through On the Job Training (OJT) and performance evaluations, safety knowledge, quality measures, and productivity along with skill abilities will be evaluated by a qualified and competent painter.

7.3.1 On the Job Training (OJT)

Novice sprayers are encouraged to practice operating spray equipment, but only under the close supervision of a qualified and competent painter to gain experience. The competent painter and trainee both need to be identified in the Daily Activity Plan. In addition, both need to be approved by job management. The supervisor shall only permit certified competent team member’s who are qualified by training and experience to operate airless spraying equipment (with the exception of training situations, in which case the trainee is under close supervision of a Cianbro competent painter).

7.3.2 Documentation

During the OJT process the competent painter will document the trainee’s progression on the Airless Sprayer Competency Checklist (see 9.4 Appendix D). Novice sprayers will not be allow to work alone until they have mastered all components of airless spraying listed on the Airless Sprayer Competency Checklist. Once completed the Airless Sprayer Competency form will be sent to the Cianbro Institute to be added to team member’s personnel file.

7.4 Safety At Home

Follow the manufacturer’s guidelines for safe operation of spraying equipment.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 References
Graco Concept and Theory Training and www.graco.com D Library
- 9.2 Appendix A 9.1 Pressure Relief Procedure, Appendix B 9.2 Maintenance, and Appendix C 9.3 Flushing
- 9.3 Document available on Cianbro.net>Standard Operating Procedures – SOP.

Airless Sprayer Competency Checklist	SD1057
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Pressure Relief Procedure



1. Engage trigger lock.



2. Shut off pump.



3. Disengage trigger lock.



4. Trigger gun to relieve pressure.
Always wear a face shield.



5. Engage trigger lock.



6. Open fluid drain valve; have a container ready to catch drainage.
Leave drain valve open until you start spraying again.



7. If you suspect that pressure is not fully relieved because:
 - *Spray tip is clogged.*

Switch Tip: Follow procedure in 9.3 Appendix C.

Flat Tip: Very slowly loosen tip guard retaining nut and relieve pressure gradually then loosen completely. Clear tip.

- *Hose is clogged*
Secure the hose with a clamp then slowly loosen hose end coupling and relieve pressure gradually. Clean hose obstruction.

If RAC Spray Tip Clogs

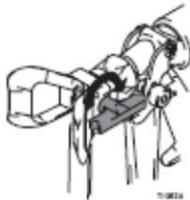


1. If spraying tip clogs while spraying, stop immediately.

2. Engage trigger lock.



3. Rotate RAC tip handle back 180°(arrow points back).



4. Disengage trigger lock.



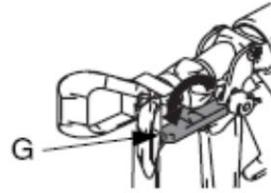
5. To remove clog, trigger gun into a pail or onto the ground.



6. Engage trigger lock.



7. Rotate RAC tip handle (G) to spraying position (arrow points forward).



8. If tip is still clogged:

a. Engage trigger lock.



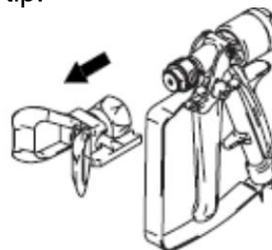
b. Shut off sprayer and disconnect power source.



c. Open fluid drain valve to relieve pressure.



d. Remove and clean GHD RAC spray tip.

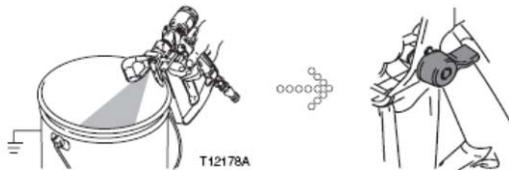


Flushing



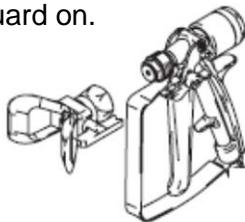
Flush pump and gun before fluid can dry in it. If available, use flushing procedure provided in your pump or sprayer manual instead of this procedure.

1. Follow *Pressure Relief Procedure*, 9.1 Appendix A. Engage trigger lock.



2. Remove spray tip. Clean with solvent.

Leave guard on.



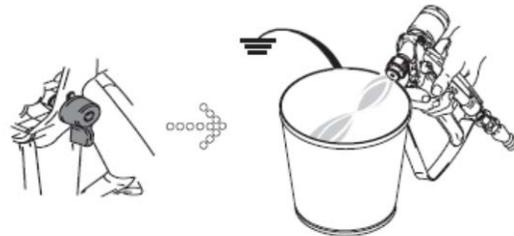
3. Put the pump intake in a pail of compatible solvent.



4. Start pump at its lowest pressure.

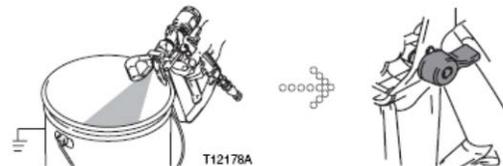


5. Disengage trigger lock, then trigger gun into the paint pail. When solvent appears, release trigger.



6. Trigger gun into solvent pail. Circulate fluid until system is thoroughly flushed.

7. Follow *Pressure Relief Procedure*, 9.1 Appendix A. Engage trigger lock.



Policy Number 055**Authorized By:** Michael W. Bennett**Title:** Line Breaking/Equipment Opening Procedure**Effective Date:** 12/15/2009Page 1 of 8

1 Status

- 1.1 Update of existing policy, effective 06/04/15.

2 Purpose

- 2.1 To outline minimum requirements for personnel who perform line breaking or equipment and vessel opening activities.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Blanking or Blinding: The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore opening and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.
- 4.2 Cleared Lines: Pipelines or equipment that have been drained, vented, flushed, and **verified** to be clear of any hazardous residue, plugs, or pressure.
- 4.3 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.
- 4.4 First Line Break: The initial opening of lines or equipment after appropriate preparation.
- 4.5 Hot Tap: Mechanical methods of adding a new tie-in or drain point to an existing piping service or equipment without interrupting the existing service.
- 4.6 Immediately Dangerous to Life and Health (IDLH): An atmospheric concentration of any 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.
- 4.7 Line Break: Opening of drained or undrained lines or equipment by disconnecting flanges, opening valves, breaking pipe joints, removing blanks or opening ports and penetrating a line by mechanical or other means.
- 4.8 Line Breaking: The physical opening or breaking apart of a portion of a process system which contains/or is suspected to contain hazardous or unknown materials. Examples include, but are not limited to, silos, piping systems, chests, hoppers, tanks, vessels and bins (openings with potential for engulfment.)

- 4.9 Undrained Lines: Any line or equipment system that has not been drained or flushed clear through existing drains, vents, or bleed valves.

5 Policy

- 5.1 These requirements of this policy will be followed anytime a line, vessel, or equipment must be penetrated or opened.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for deviations from this policy.
- 6.2 The Manager of the job site is responsible for the implementation of this policy on the job site.
- 6.3 Corporate Safety is responsible for maintaining this document.
- 6.4 The line break supervisor is responsible for filling out and getting approval of the line break permit.

7 Line Breaking/Equipment Opening Procedure Index

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7.3	Emergency Procedures.....	3
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7.6	Changes to Plan.....	8
7.7	Ending the Permit.....	8
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7.1 Planning

7.1.1 Activity Plan

A detailed activity plan is required that addresses the line break or line breaks that will be performed that day with a thorough hazard analysis and hazard controls identified. In addition to engineering and administrative controls, the activity plan will detail the area to be barricaded and what PPE will be required.

Hazards include chemicals, pressure, heat and cold, flammable atmosphere, and potential for IDLH atmosphere.

7.1.2 Identification of initial Break Point

The break points must be clearly identified in the activity plan. They must also be marked at the actual point the break or tap will take place or as close as humanly possible by attaching a visual indicator or tag. Show the break point to all team members who will be participating in the activity.

7.1.3 Line Break/Equipment Opening Permit

A completed and signed permit is required before any initial line breaking, flange breaking, hot tap, or vessel opening of any new system. See form SD839 available out on Cianbro.net/Resourses/Forms.

7.1.4 Exceptions to this policy: Equipment maintenance, propane tanks, all temporary compressed gas cylinders (oxygen, acetylene, map gas, chemtane shielding gases, etc.), all temporary compressed air lines, all temporary water lines, hydraulic quick disconnects, and mobile equipment. All water and air lines that can be locked out and drained and certified zero energy.

7.1.5 Vessel exceptions: You must be able to visually observe inside the tank to verify if it is empty. Opening of the drain alone is not verification.

7.2 Training

All team members taking part in the activity must be trained in the following:

- The requirements of this procedure
- How to interpret the requirements on the line breaking permit
- Required PPE
- Hazcom – specific hazards of the chemicals that could be encountered during the activity including a review of the SDS sheet(s)

7.3 Emergency Procedures

(Must be included in the activity plan)

7.3.1 Locations of nearest emergency eyewash stations and showers

7.3.2 Methods to summon emergency services

7.3.3 Evacuation routes and procedures

7.3.4 Any pertinent emergency first aid measures

7.4 Double Block and Bleed Requirements

7.4.1 Whenever we are performing line breaking on a system containing acid (ph < 5), caustic (ph > 10), high heat (> 200 degrees), high pressure (> 100 lbs.), flammable materials (flash point < 120 degrees), or IDLH atmospheres; double block and bleeding is required on each side of the line break location (if it is physically possible). If it is not physically possible, methods must be identified and implemented to provide the same level of protection.

7.5 Line Breaking Procedure

Regardless of the initial planning and precautions taken, the initial checking done and the instruments employed to test the lines or equipment, it must always be assumed that at the point where the line is to be broken contains product or gas that will spurt out. Anticipate the unknown and unplanned cross connection.

7.5.1 Scope

Line breaking operations include, but are not limited to, the opening of or working on any process lines, their connected fittings or valves, gauges, sight glasses, pumps or vessels that contain or have ever contained hazardous liquids or gases. The replacing of packing in pumps in place, or on the agitator shafts of pressure vessels are also considered to be line breaking operations. Other examples of packing replacements requiring line breaks include, but are not limited to, soot blowers and valves.

7.5.2 Line Break Permits

A line breaking permit must be completed by the supervisor in charge of the work. A properly completed line breaking permit must be attached to the activity plan and reviewed with all team members. The permit must be reviewed and hazardous conditions identified at the start of each shift in the new activity plan when new personnel take over and continue the job. The new incoming supervisor must sign off on the permit. Each crew member must sign off on the activity plan.

7.5.3 Personal Protective Equipment

- A. The required PPE must be identified in the activity plan and line break permit. In the case of potential IDLH atmospheres, the PPE will include SCBA or supplied air respirators with an escape bottle. All team members must be trained in the PPE to be used. For respiratory protection refer to 005 Respiratory Protection Program Policy and Procedure.
- B. For each of the hazardous materials listed below, the following minimum protective gear and clothing is required for line breaking jobs. All jobs must be evaluated for additional protective gear and clothing requirements and any additions should be recorded on the permit. (List is not inclusive, PPE and clothing must be identified for any hazardous situation not listed below)
 1. All items include a hard hat. All items include safety glasses with side shields unless otherwise specified (e.g. chemical safety goggles).
 2. Corrosive Materials: (Acid, Oleum, and Caustic)
 - a. Chemical resistant suit: Coat and overalls made of rubber, neoprene, or PVC.
 - b. Face shields
 - c. Goggles
 - d. Gloves: gauntlet type made of neoprene, PVC or an equally resistant material
 - e. Rubber boots with steel toes
 - f. Respirator if needed. (Worn in accordance with the written site specific respirator plan)

3. Petroleum Materials: (Gasoline, Propane, Diesel, Butane, LNG, etc)
 - a. Nomex coveralls: Rain Coat, overalls - rubber, neoprene, or PVC
 - b. Rain hood (e.g. Overhead Work, jobs that take place above the waist.)
 - c. Face shields
 - d. Goggles
 - e. Gloves: gauntlet type made of neoprene, PVC or an equally resistant material
 - f. Rubber boots with steel toes
 - g. Respirator if needed. (Worn in accordance with the written site specific respirator plan)

4. Hazardous Material: (Sewage, Sanitary and Mold)
 - a. Tyvek suit: Coveralls (Coated if liquid materials)
 - b. Face shields
 - c. Goggles
 - d. Gloves: gauntlet type made of neoprene, PVC or an equally resistant material
 - e. Rubber boots with steel toes
 - f. Respirator if needed. (Worn in accordance with the written site specific respirator plan)

5. Steam Lines:
 - a. Face shield
 - b. Leather gloves

6. High Pressure Air Lines or Natural Gas Lines:
 - a. Face Shield
 - b. Leather Gloves

7. Nitrogen Lines:
 - a. Face Shield
 - b. Leather Gloves
 - c. Respirator if needed. (Worn in accordance with the written site specific respirator plan)

7.5.4 Safe Precautions and Methods For Line Breaking

- A. Breaking a line is in essence breaking into a closed system. You cannot guarantee that all piping systems and equipment are completely drained, contain no plugs, or are free of pressure even after the first connection has been broken. There is an added hazard that when cooling occurs, vacuums, which may be holding liquids in pockets, often break without warning and liquid is released to run to the lowest point. Plugs, particularly solidified process materials, can move and release materials well after the first connection has been broken

All systems must be considered as having the potential to discharge hazardous liquid from open ends of line or broken flanges at any time, even after the line has been drained and vented.

- B. The following requirements must be met for all line breaks:
1. A completed line break permit will be filled out and in the possession of the job foreperson.
 2. The Cianbro project manager, the Client/Owner or his/her designee competent supervision (e.g. Production Supervisor, Maintenance Foreman or Lead Person) will approve and sign-off on the line breaking permit prior to starting the work.

3. Client/Owner or designee shall flush, neutralize or, at a minimum, drain systems (i.e. - washout, steam, clear blockages, open drains and vents, depressurize, lockout/tagout, etc.) prior to Cianbro beginning line breaking. They should make sure to contain any residual product and remove it from the work area.
4. When performing a line break on a system which contains a hazardous substance, a water hose or a suitable dilution agent will be stretched to the point of the line breaking, with the water running or charged and isolated at the end. Take necessary precautions if the hose could freeze.
5. Conduct lockout following Cianbro's Zero Energy State Policy and Procedure. In addition, in cases where pumps are actuated only by a float valve, or where it is not possible to make a positive check on the lockout, the equipment will be isolated by either pulling the fuses, disconnecting wires or by some other means to deactivate the source of energy.
6. If such pumps, motors or equivalent are activated by mechanical devices such as floats, the devices will be operated manually to insure that the system has been deactivated by client/owner or his/her designee.
7. The portion of the line being worked on will be isolated from the rest of the system in the most effective way.
8. This will usually consist of either blanking or shutting valves and locking them. Where applicable, a client/owner department process foreman or a process operator, who is familiar with the individual valve, will be the judge of whether a valve is in the closed position. A Cianbro supervisor will inspect the valve and determine that it is closed and no stored energy is present.
9. Prior to the actual line breaking, the area will be barricaded for maximum protection to passersby and nearby workers with red danger tape. A funnel or suitable container to collect the drainage will be used where applicable. Where floor openings are near, insure that liquids are isolated to prevent possible exposures on other floors below.
10. It is difficult to prescribe a general set of rules covering the precise and safest way to accomplish all line openings. All breaks will be thoroughly planned with a completed permit.
11. When dismantling or opening closed pressurized or gravity fed systems, internal pressure shall be relieved or other methods utilized to prevent sudden release of pressure or spraying of liquid. These will include:
 - a. Loosen the bolts of a flange that are farthest from the team member first.
 - b. Replace potentially corroded bolts one at a time prior to the actual line breaking.
 - c. Shield wherever possible. Stand aside to avoid any spray.
 - d. Flange spreaders or flange jacks should be used for opening flange joints whenever the use of such tools is possible and practical to minimize team member exposure.
 - e. Where the use of such tools is impossible or impractical due to close quarters or size of pipe, standard wedges will be used as an alternate. In such cases, a suitable chain or a strong flexible wire must be attached to the wedge and the pipe line or other fixed objects so as to prevent the wedge from flying in the event it slips out of the joint.
 - f. Wherever possible, old flange bolts will be removed one at a time and replaced with new bolts that can be gradually backed off as the wedge is being inserted. This will prevent sudden openings of the joint, particularly where it is under stress.

16. Down Time After Line Breaking

- a. Where line breaking includes an extended period of down time following the breaking, such as in the replacement of a pump, the breaks in the system will be properly capped as with blind flanges or fry pans will be installed of the appropriate material of construction unless the lock out process zero energy policy can guaranty zero flow. In all cases, the blind flanges shall be of sufficient strength, and installed as to provide safe conditions of pressure, temperature and service.
- b. Safeguards such as locked switches and locked valves will be continued until the system is again a closed or continuous one.
- c. Where there is the possibility of a line refilling, a drain valve will be attached to the blank flange used.

7.6 Changes to Plan

- 7.6.1 Whenever conditions change from the original plan you must stop and reassess. If conditions are changed from those contained in the original permit, then a new permit must be completed and signed.

7.7 Ending the Permit

- 7.7.1 All openings of lines or systems made during the course of the job must be checked for closure before the job is considered to be complete and released for resumption of normal use. When the job is completed, the person performing the job should return the permit to the Cianbro safety specialist or designee and inform him/her that the job has been completed.
- 7.7.2 Safety personnel and/or location management will review the completed line breaking permits on a quarterly basis to ensure that suitable safety precautions are being taken in performing the work involved.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials required and PPE requirements under this policy and to provide necessary training.

9 Related Documents

- 9.1 Document available on Cianbro.net>Standard Operating Procedures – on the SOP.

Cianbro Corp Line Breaking Permit and Tag	SD839
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Policy Number: 056

Authorized By: Michael W. Bennett

Title: Inspections By Government or State Agencies

Effective Date: 06/03/11

Page 1 of 5

1 Status

1.1 Update of existing policy, effective 06/04/15.

2 Purpose

2.1 Provides guidance to the management teams at Cianbro worksites

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 Abate: To fix.

4.2 Citation: is a written notification of alleged violations of the regulations and standards (OSHA, MSHA, or other) intended to inform the employer and employees. It includes the proposed length of time set for abatement of the violations. A notice of proposed penalty may be included or may be received at a later date.

4.3 MSHA: Mine Safety and Health Administration

4.4 OSHA: Occupational Safety and Health Administration

4.5 EPA: Environmental Protection Agency

4.6 DEP: Department Of Environmental Protection

4.7 OSHRC: Occupational Safety and Health Review Commission

5 Policy

5.1 Our responsibilities when inspections by government, state or local agencies take place on Cianbro work sites.

6 Responsibilities

6.1 The manager at the site is responsible for the implementation of this policy on the job site.

6.2 The top manager present at the site at the time is responsible for notification of the corporate safety department and their operational HR manager and for interacting with the compliance officer.

6.3 Corporate safety is responsible for maintaining this document.

7 Inspection By Government or State Agencies Index

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7.1 Agency Inspections (OSHA, MSHA, EPA etc.)

7.1.1 When a compliance officer from a government agency shows up on site he/she displays official credentials and asks to meet an appropriate employer representative. If they do not present their credentials ask to see the compliance officer's credentials and ask what triggered the inspection. An official compliance officer carries credentials bearing his or her photograph and a serial number. Their credentials should be verified by phoning the nearest compliance agency office if there are any concerns.
To find nearest OSHA compliance agency office: <http://www.osha.gov/html/RAMap.html>.

7.1.2 Bring the compliance officer into the job site office, perform a site orientation, and make sure the officer has all the necessary PPE.

7.1.3 Immediately contact the Corporate Safety Department in the following order until someone is reached. Indicate that you are notifying them that a regulatory agency inspection is taking place on your site.

- Mike Bennett, VP HR, Health, Safety & Environmental 207-416-8302
- Scott Knowlen, HSSE Manager 207-416-9579
- Safety department must answer line 207-679-2460

Please notify your Operational HR manager as well.

7.1.4 While conducting the site orientation with the compliance officer:

- Have someone in management communicate to team member's onsite that there is an agency inspection taking place.
- Have someone in management walk the site to make sure that everything is in order while the opening conference is taking place with the compliance officer.
- For OSHA inspections be sure to review the list of Cianbro citations as any repeat citations issued within the last five years could lead to a repeat or willful penalty.

How to review Cianbro's OSHA citations: Go to TM.Cianbro.net and search for OSHA citations

- Obtain a digital camera, notepad, tape measure, flashlight, or any other items necessary to mirror the documentation of the inspector

7.1.5 A site inspection consists of three parts:

A. Opening conference

- In the opening conference, the compliance officer explains why the site was selected, the purpose of the visit, the scope of the inspection, and the standards that apply.
- We will be given a copy of any employee complaint that may be involved in this site visit. The employee may have requested, that his or her name not be revealed. Keep in mind this could be a subcontractor complaint.
- We will be asked to select a representative to accompany the compliance officer during the inspection.
- For EPA (or DEP) inspections, be sure the inspector adequately explains why the visit is being conducted and what program or license they are representing. This is

necessary so appropriate records and documentation of compliance can be gathered during the site walk.

B. Inspection Tour

- Management will accompany the compliance officer and treat them with dignity and respect.
- The officer can inspect any part of the job and determine the route and duration of the inspection. However, we can choose the path if none is specified.
- Have someone walk around with management that will be able to immediately abate (fix) everything that was detected by the compliance officer. Document items that were abated.
- Make sure the compliance officer takes note of the immediate fixes in his/her notes. Even though corrected the apparent violations may still serve as the basis for a citation and/or notice of proposed penalty.
- The compliance officer will observe conditions, consult with team members privately if necessary, take photos (for record purposes), take instrument readings or examine records.
- Take notes and pictures (from multiple angles) anywhere the compliance officer does. This allows us to capture valuable information that we may need to refer to later while abating, contesting or investigating the root cause.
- Any documents provided to the inspector must be copied for our records.

C. Closing conference

- Held between the compliance officer onsite and Cianbro management.
- The compliance officer discusses all conditions in question observed on the inspection tour and indicates all apparent violations for which a citation/fine may be issued or recommended and for OSHA he/she will explain our appeal rights.
- Make sure to ask questions to clarify what they saw.
- During the closing conference, Cianbro may wish to produce records to show compliance efforts and to provide information which can help determine how much time may be needed to abate an alleged violation. When appropriate, more than one closing conference may be held. This is usually necessary when health hazards are being evaluated, when laboratory reports are required, or the officer obtains additional factual evidence while concluding an accident investigation.
- Review all aspects of the inspection with the regulator/compliance officer to be sure the understanding of both parties is the same.
- Request a written copy of the notes from the inspection before the regulator or compliance officer leaves or be sure a follow up report is sent to corporate safety from the regulatory agency in a timely manner.

7.1.6 When a follow-up inspection is required

A follow-up inspection determines whether previously cited violations have been corrected. If an employer has failed to abate a violation, the compliance officer informs the employer that he/she is subject to "Notification of Failure to Abate" alleged violations and may face additional proposed daily penalties while such failure or violations continues.

7.2 OSHA Citation Issued by the Area Director

The compliance officer will not issue the citations. They will make recommendations to the area manager who will issue the citations. After the compliance officer reports findings, the area director determines what citations, if any will be issued, and what penalties, if any, will be proposed. Anyone who tries to collect a penalty at the time of inspection, or promotes the sale of a product or service at any time, is not an OSHA compliance officer (or Environmental Inspector). Posing as a compliance officer is a violation of law; suspected impostors should be promptly reported to local law enforcement agencies.

7.2.1 Citations inform the employer and employees of the regulations and standards alleged to have been violated and of the proposed length of time set for their abatement.

7.2.2 The employer will receive citations and notices of proposed penalties by certified mail.

7.2.3 The employer must post a copy of each citation at or near the place a violation occurred, for three days or until the violation is abated, whichever is longer.

7.3 OSHA Penalties

These are the types of violations that may be cited and the penalties that may be proposed:

7.3.1 Other Than Serious Violation - A violation that has a direct relationship to job safety and health, but probably would not cause death or serious physical harm. A proposed penalty of up to \$7,000 for each violation is discretionary. A penalty for an other-than-serious violation may be adjusted downward by as much as 95 percent, depending on the employer's good faith (demonstrated efforts to comply with the Act), history of previous violations, and size of business. When the adjusted penalty amounts to less than \$100, no penalty is proposed.

7.3.2 Serious Violation - A violation where there is substantial probability that death or serious physical harm could result. A penalty of up to \$7,000 for each violation may be proposed. A penalty for a serious violation may be adjusted downward, based on the employer's good faith, history of previous violations, the gravity of the alleged violation, and size of business.

7.3.3 Willful Violation - A violation that the employer knowingly commits or commits with plain indifference to the law. The employer either knows that what he or she is doing constitutes a violation, or is aware that a hazardous condition existed and made no reasonable effort to eliminate it.

- Penalties of up to \$70,000 may be proposed for each willful violation, with a minimum penalty of \$5,000 for each violation. A proposed penalty for a willful violation may be adjusted downward, depending on the size of the business and its history of previous violations. Usually, no credit is given for good faith.
- If an employer is convicted of a willful violation of a standard that has resulted in the death of an employee, the offense is punishable by a court-imposed fine or by imprisonment for up to six months, or both. A fine of up to \$250,000 for an individual, or \$500,000 for a corporation, may be imposed for a criminal conviction.

7.3.4 Repeated Violation – If the employer has been cited previously, within the last five years, for the same or a substantially similar condition or hazard and the citation has become a final order of the OSHRC. Repeat violations can bring a fine of up to \$70,000 for each violation.

7.3.5 Failure to Abate Prior Violation - Failure to abate a prior violation may bring a civil penalty of up to \$7,000 for each day the violation continues beyond the prescribed abatement date.

7.3.6 De Minimis Violation - De minimis violations are violations of standards which have no direct or immediate relationship to safety or health. Whenever de minimis conditions are found during an inspection, they are documented in the same way as any other violation, but are not included on the citation.

7.4

Other Penalties

- 7.4.1 Environmental penalties can range from a letter of warning to a notice of violation requiring a consent agreement and may or may not include monetary penalties.
- 7.4.2 MSHA can range from a withdrawal order for imminent danger to a citation with monetary penalties. Citations that are marked significant and substantial (S&S) carry the most weight and we will attempt to have that severity reduced.

7.5 OSHA Appeals by Employers

When issued a citation or notice of a proposed penalty, an employer may request an informal meeting with OSHA's area director to discuss the case. Employee representatives may be invited to attend the meeting. The area director is authorized to enter into settlement agreements that revise citations and penalties to avoid prolonged legal disputes.

7.6 OSHA Petition for Modification of Abatement

Upon receiving a citation, the employer must correct the cited hazard by the prescribed date unless he or she contests the citation or abatement date. Factors beyond the employer's reasonable control may prevent the completion of corrections by that date. The written petition should specify all steps taken to achieve compliance, the additional time needed to achieve complete compliance, the reasons such additional time is needed, all temporary steps being taken to safeguard employees against the cited hazard during the intervening period, that a copy of the petition was posted in a conspicuous place at or near each place where a violation occurred, and that the employee representative (if there is one) received a copy of the petition.

7.7 OSHA Notice of Contest

If the employer decides to contest either the citation, the time set for abatement, or the proposed penalty, he or she has 15 working days from the time the citation and proposed penalty are received in which to notify the OSHA area director in writing. An orally expressed disagreement will not suffice. This written notification is called a "Notice of Contest." There is no specific format for the Notice of Contest; however it must clearly identify the employer's basis for filing the Notice of Contest, notice of proposed penalty, abatement period, or notification of failure to correct violations. A copy of the Notice of Contest must be given to the employees' authorized representative. If any affected employees are not represented by a recognized bargaining agent, a copy of the notice must be posted in a prominent location in the workplace, or else served personally upon each unrepresented employee.

7.8 Lessons Learned

A Lesson Learned will be completed on all Government Agency citations. A Lesson Learned is a great tool for sharing information about overcoming obstacles, addressing why the situation occurred and preventative measures for the future. A Lesson Learned is a positive experience, situation in which we learn a valuable lesson and share throughout the company. All proposed citations will be investigated to determine root causes and corrective actions.

8 Budget / Approval Process

- 8.1 Cost of following this policy is the responsibility of the specific Cianbro site.

9 Related Documents

- 9.1 OSHA Inspections – OSHA Document #2098
- 9.2 <http://www.osha.gov/doc/outreachtraining/htmlfiles/introscha.html>

Policy Number: 057**Authorized By:** Michael W. Bennett**Title:** Spill Prevention and Control Safety Policy**Effective Date:** 07/01/11Page 1 of 8

1 Status

- 1.1 Update of existing policy, effective 06/27/14.

2 Purpose

- 2.1 To provide spill prevention and response information to allow sites to minimize the potential for spills.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Tier 1 Facility - A qualified Tier 1 Facility meets the following criteria:
- A. The aggregate aboveground oil storage capacity of the facility is 10,000 U.S. gallons or less; and
 - B. The facility has had no single discharge as described in §112.1(b) exceeding 1,000 U.S. gallons and no two discharges as described in §112.1(b) each exceeding 42 U.S. gallons within any twelve month period in the three years prior to the SPCC Plan self-certification date, or since becoming subject to 40 CFR part 112 if the facility has been in operation for less than three years (not including oil discharges as described in §112.1(b) that are the result of natural disasters, acts of war, or terrorism); and
 - C. There is no individual oil storage container at the facility with an aboveground capacity greater than 5,000 U.S. gallons.
- 4.2 SPCC - Means a Spill Prevention, Control, and Countermeasure Plan. All sites that store 1320 gallons of fuels and oils in containers 55 gallons or larger are required to develop a formal SPCC plan that meets the requirements contained in 40 CFR part 112, the Oil Pollution Prevention; Spill Prevention, Control, and Countermeasure (SPCC) Rule
- 4.3 Site specific spill prevention and response plan – all sites that do not require a formal SPCC plan will develop a spill prevention and response plan adequate for the potential spills at that site.

5 Policy

- 5.1 All Cianbro sites storing and/or using fuels, oils or other materials with the potential for spills will have a written site specific spill prevention and response plan at a minimum.
- 5.2 All Cianbro sites storing 1320 gallons of oil or more as defined in 40 CFR part 112, with the potential for that oil to reach waters of the state if spilled, will develop and implement a qualified SPCC plan.

6 Responsibilities

- 6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.2 The corporate safety department is responsible for maintaining this document.

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7.1 Planning for Spill Prevention and Response

Cianbro sites storing and/or using fuels, oils or other materials are required to have a site specific spill prevention and response plan. The plan will focus on how to prevent spills and how to minimize the impact of spills if they occur. It will also identify when it is appropriate for the site to handle the spill and when it requires an outside emergency response team.

7.1.1 Identify the Potential Spills

- Identify what chemicals, oils (biodegradable oils included), fuels, etc. could be spilled on your site. Identify the most likely spills as well as the worst case spills. Identify if an SPCC plan will be necessary (Refer to Section 7.5).

7.1.2 Create a Plan

- Include notification procedures, who to notify, how quickly, specific phone numbers to use, etc.
- Include specific actions and steps for team members to take when they encounter a spill
- DO NOT try to stop or contain a spill if you are unsure whether you can perform the action safely.

7.1.3 If developing a formal SPCC Plan

- The project can self-certify a SPCC plan under 40 CFR part 112 if it meets the definition of a Qualified Tier I facility defined above.
- Templates for a Tier I qualified facility EPA plan can be found at the EPA SPCC website or contact the Corporate HSSE Manager.

7.2 Training

7.2.1 All team members on site will be trained in the contents of the site specific spill prevention and response plan during their mandatory initial site orientation and periodically throughout the duration of the job. Topics must include:

- How to get help if a spill is encountered
- Size of the spill they can clean up under this plan
- When to try to prevent the spill from reaching water or to stop the spill versus calling for help
- The contents of the site specific plan
- Location of spill cleanup materials and PPE
- Waste storage and disposal

7.2.2 This training does not qualify team members to provide emergency response to spills or threats of spills. It only allows team members to respond to incidental releases of hazardous substances on their site which do not pose a significant safety or health hazard to team members in the immediate vicinity or to the team member cleaning it up. These incidental spills may be cleaned up by team members who are familiar with the hazards of the chemicals with which they are working. For all other spills, contact an emergency response company. Refer the Cianbro Hazardous Waste/Hazardous Materials Handbook for the company Cianbro currently uses. Contact with that emergency response company should be made at project start up and documented in the site spill prevention plan or SPCC plan.

7.3 Spill Prevention

7.3.1 Identify potential spill locations or operations

- What chemicals, systems, vehicles and other sources of potential releases are present?
- What operations could result in a spill?
- Where are spills most likely to occur?
- What chemicals are present and in what quantities?

7.3.2 For each potential spill operation or location, identify mitigating actions to prevent or minimize the impact of a spill

- Identify where to park vehicles
- Use containment underneath equipment
- Identify where to locate fuel tanks, hydraulic power packs, and any material or piece of equipment with the potential to contribute to a significant spill so it could not get to water
- Identify how to prevent spills on barges from reaching the water
- Keep materials covered and containers securely closed
- Put catch/drip pans under pipe threading machines, at fueling areas to catch drips from the nozzles, etc.

7.3.3 Identifying Sensitive Areas

- Where will the spill go? Direction of release noted for each potential spill activity
- Where would a spill end up (water, sewer, ground, air)?
- Are there any sensitive surface water bodies or ground water sources such as wells or aquifers on the site or near the site?

7.3.4 Storage of Hazardous Substances

- Hazardous substances must be stored in proper containers to minimize the potential for a spill.
- Whenever possible, hazardous substances should be kept in closed containers
- Store hazardous substances so they are not exposed to storm water
- Provide secondary containment or double walled tanks for any containers larger than 55 gallons.

7.3.5 Best Management Practices

- Areas where chemicals or materials may be used or stored must be maintained using good housekeeping practices. This includes, but is not limited to, clean and organized storage, labeling, and secondary containment where necessary.
- Identify standard operating procedures for fueling equipment and other routine tasks to eliminate spills.
- Put maintenance and inspection procedures in place for material storage areas, equipment, tanks, hydraulic hoses, vibro hammers, etc.

7.4 Spill Response

7.4.1 Remain calm. If there is danger of fire, call the local fire department.

7.4.2 If you can do it safely (if you do not know what has spilled then you cannot do it safely) then:

- Stop the source of the spill, if possible, by valving, plugging, caulking, or other means available. Secure the area with barrier tape.
- Take any brief action that will prevent or delay oil from reaching navigable waters or spreading across the surface of the ground. This may require building a dike with soil, speedy-dri, rags or pads; or digging a trench to divert the flow of oil.

7.4.3 If a brief action will not be effective or once you have taken what action you can, notify your supervisor about the spill so we can involve additional help and resources

- 7.4.4 Identify who will make notification calls and what methods will be used in the site specific plan. Ensure identified communication equipment is always available.
- 7.4.5 Notify Appropriate Parties
- Notify the Cianbro Corporation HSE Manager within 30 minutes of identifying a spill
 - Notify the state environmental agency within 2 hours at the number contained in the site specific spill plan
 - Notify the National Response Center at (800) 424-8802 within 2 hours if any amount reaches the water or the spill involves reportable quantities that have or are likely to leave the site.
 - Notify the client as identified in the site specific spill plan
 - Document to who and when the notifications were made
- 7.4.6 Spill Kits
- The potential spill operations or areas you identified in section 7.1.1 will determine what you need for spill kits based on what materials can be spilled and how much.
- Identify what materials are needed in each kit (socks, booms, pads, absorbents, shovels, etc.) An example of possible spill kit contents is attached to this policy.
 - Identify how big the spill kits need to be
 - Identify where spill kits are to be located
 - Identify how many spill kits are needed
 - Include necessary PPE
 - Do weekly inspections to ensure spill kits are available and complete when needed
 - Ensure the spill kits are clearly labeled and easily available
- 7.4.7 Spill Cleanup
- Clean up all possible traces of spills
 - Identify how much of the product is recovered
 - Store in appropriate bags and containers
- 7.4.8 Waste Disposal
- Determine whether the spill clean up material is a hazardous waste or not
 - Dispose of it through the client or one of Cianbro's approved waste haulers (Refer to the Cianbro Hazardous Waste/Hazardous Materials Handbook).
 - Contact the state you are working in to identify other disposal options
- 7.4.9 Spills to Water
- Ensure plans are in place to prevent any spill to water
 - All spills to water must be reported to the National Response Center
 - If oil has or will reach a water source, deploy an oil boom. This must be done for any spill involving a product entering water or potentially entering the water.
 - Ensure adequate spill boom is on site.

7.5 SPCC Plans

- 7.5.1 A plan is generally required for any facility with more than 1,320 gallons of aboveground oil storage capacity in containers of 55 gal or more. It does not matter how much is actually in the container, you must include all containers of 55 gal or larger. Motive power tanks (fuel tanks on equipment to provide motive power) and permanently closed containers do not have to be counted.
- 7.5.2 "Oil" as defined under federal regulations includes petroleum oils such as gasoline, diesel, kerosene and heating oil, as well as non petroleum oils such as animal and vegetable oils, synthetic oils, biodegradable oils, and mineral oils.
- 7.5.3 The plan must be certified by a registered Professional Engineer or if a qualified Tier I facility the plan may be self-certified. (A Tier 1 facility is defined in 40 CFR§112.3(g)(1))
- 7.5.4 The plan must be reviewed by the owner every five years. This periodic review of facilities should give consideration to any changes in codes, standards and available technology in order to keep facilities up to the "state-of-the-art"; and, the review will

determine if there is a need to amend the plan. Plans must also be amended whenever there is a change in the facility that would affect the plan

7.5.5 Cianbro must also certify their commitment to make available the resources necessary to implement the SPCC Plan and to control and remove any discharge

7.5.6 Contact the Cianbro Corporation HSE Manager if the criteria contained in 7.5.1 are expected to be exceeded for information on how to develop the plan.

7.6 Spill Reports

7.6.1 Completely fill out the Cianbro Spill Report (Form SD832) including the agency contacts and any assigned spill numbers. Include pictures, MSDS's, etc as appropriate.

7.6.2 Send the completed form to the Cianbro Corporation HSE Manager by email to corpsafety@cianbro.com. Send the original by interoffice mail.

8 Budget / Approval Process

8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

9.1 See attachments.

Reporting Spills to NRC or EPA

National Response Center

A facility should report discharges to the National Response Center (NRC) at 1-800-424-8802 or 1-202-426-2675. The NRC is the federal government's centralized reporting center, which is staffed 24 hours per day by U.S. Coast Guard personnel.

If reporting directly to NRC is not practicable, reports also can be made to the EPA regional office or the U.S. Coast Guard Marine Safety Office (MSO) in the area where the incident occurred.

- Name, organization, and telephone number
- Name and address of the party responsible for the incident
- Date and time of the incident
- Location of the incident
- Source and cause of the discharge
- Types of material(s) discharged
- Quantity of materials discharged
- Danger or threat posed by the discharge
- Number and types of injuries (if any)
- Weather conditions at the incident location
- Other information to help emergency personnel respond to the incident

EPA Regional Administrator

Under the SPCC Rule: A discharge must be reported to the EPA Regional Administrator (RA) when there is a discharge of:

- More than 1,000 U.S. gallons of oil in a single discharge to navigable waters or adjoining shorelines
- More than 42 U.S. gallons of oil in each of two discharges to navigable waters or adjoining shorelines occurring within any twelve-month period

When determining the applicability of this SPCC reporting requirement, the gallon amount(s) specified (either 1,000 or 42) refers to the amount of oil that actually reaches navigable waters or adjoining

Spill Kit Contents

Disclaimer: These are recommended items to be used in spill kits; however, special consideration should be given to what materials/chemicals are being used in the area. If any solvents are available, appropriate absorbents should be in the kit as well as protective gloves for that material. Safeware sells all of the items below. Making up our own kits is less expensive than purchasing the full kit pre-made.

Small Kit: For equipment or truck use, package in a clear plastic bag so team members can see easily what is in it.

- 2-4 General Socks (oil absorbent booms)
- 10-15 Universal perforated absorbent pads or oil only absorbent pads depending on work area activity
- 1-2 Contractor grade disposal bag with zip tie
- 2-3 nitrile or latex gloves
- Laminated sheet with state agency, corporate and site specific emergency contact info for spills.

Large Kit to place in a 55 g drum:

- 50 absorbent pads (oil)
- 4 small socks about 12"-18"
- (2) 3' to 8' absorbent boom. Length would depend on area of work vs spill potential
- Nitrile or latex gloves, multiple
- Contractor grade disposal bags, 2-4
- Goggles
- Laminated sheet with state agency, corporate and site specific emergency contact info for spills.

Policy Number 058**Authorized By:** Michael W. Bennett**Title:** Planning For Work Outside of Established Work Hours/Conditions**Effective Date:** 09/02/11Page 1 of 3

1 Status

1.1 Update of existing policy, effective 09/04/14.

2 Purpose

2.1 Ensure the health and safety of team members (TM) working alone or performing work outside of established work hours.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

3.2 This policy does not apply to fixed based office personnel working in a fixed based facility.

4 Definitions

4.1 None

5 Policy

5.1 Establish a written plan for Team Member (TM) working alone or work performed outside of established work hours.

6 Responsibilities

6.1 The top Cianbro manager on the job site or in the Department is responsible for the implementation of this policy.

6.2 The corporate safety department is responsible for maintaining this document.

7 Planning For Work Outside of Established Work Hours/Conditions Index

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7.1 Responding to Before/After Hours Emergencies

7.1.1 Develop a plan for responding to emergencies that occur outside of the site working hours. Communicate that plan to the client, the site team members, and any subcontractors.

- The plan will include a contact list with order of contact and primary and secondary contact methods.
- Include contact information for local emergency responders (refer to the site contingency plan).
- No team member is to respond alone. Meet at least one other team member or meet the police or other emergency responder prior to entering the worksite.

7.2 Written Plan for Working outside of Regular Hours

Sometimes it is necessary for team members to work outside of normal site work hours. Team members may have to stay late to unload a truck, come in on a weekend to check a pump or other piece of equipment, etc. An overall site plan must be developed to deal with these situations.

7.2.1 In these cases the plan must include:

- Contact list for emergencies
- Primary and secondary methods of contact
- Hazard analysis and controls (can be done as part of the activity plan for the specific activity)
- Location of the Grab-N-Go and the Medical Facility to be utilized
- Requirement to notify a manager when the activity is complete.

7.3 Working Alone

It is the policy of Cianbro that no team member is allowed to work alone on the project or work site. If there are situations where this policy can't be met then it must be approved by the project manager.

7.3.1 Requirements - If a team member must work alone then:

A thorough activity plan must be developed including a detailed hazard assessment to evaluate the risk of working alone and identify appropriate control measures. The hazard assessment shall address hazards and identify control measures in order to minimize risk associated with working alone.

- All team members working alone must carry a cellular phone or other electronic monitoring device at all times.
- A check-in/check-out process must be implemented so that team members are contacted at regular intervals and a manager is notified when the work is complete. The process can include the team member calling a manager periodically or the manager checking in with the team member periodically. The length of time between check-ins will be shorter the greater the risk identified in the activity plan but will not exceed one hour in any case.

- A lead person or above will be assigned the responsibility of establishing contact with the team member working alone. In addition, a back-up form of communication shall be identified in the activity plan in case the primary form of contact is not working. Each contact shall be documented including time, status of the team member, and any identified issues or changes.

If the team member does not respond the following will be implemented immediately:

- Call 911 or the emergency number that has been identified in the site contingency plan.
- Call the Cianbro site emergency coordinator identified in the contingency plan. Continue to the next person on the Cianbro emergency contact list if necessary. Meet that person at the site. Do not respond alone.
- Follow other procedures from the activity plan based on the identified hazards including instituting a search if necessary. A search shall be instituted if the team member can not be immediately found within 10 minutes once you or the police arrive at the site. It is the responsibility of the Cianbro emergency coordinator to decide when a search is required and to begin to mobilize appropriate emergency services.

8 Budget / Approval Process

8.1 The job site is responsible for costs associated with this policy.

9 Related Documents

9.1 Site Specific Contingency Plan

Policy Number: 059**Authorized By:** Michael W. Bennett**Title:** Vacuum Truck Safety**Effective Date:** 09/02/11Page 1 of 6

1 Status

1.1 Update of existing policy, effective 12/04/14.

2 Purpose

2.1 To ensure safe operation of vacuum trucks used on our job sites

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 None.

5 Policy

5.1 All subcontractors and/or Cianbro team members will meet the requirements of this policy, the client, and the manufacturer for the use of vacuum trucks.

6 Responsibilities

6.1 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.

6.2 The corporate safety department is responsible for maintaining this document.

7 Vacuum Truck Safety Index

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Though Cianbro does not own or operate vacuum trucks, we often contract with subcontractors who do use vacuum trucks to perform operations on our sites. This policy provides both requirements and guidelines for safe operation of vacuum trucks. The requirements of this policy are mandatory for vacuum truck operations for petroleum related activities and any activity involving flammable liquids.

7.1 Planning and Operation

- 7.1.1 A hazard analysis/Job Safety Analysis if required prior to performing the task and must be reviewed and signed by the crew. The hazard analysis must consider all of the hazards listed in Section 7.2.
- 7.1.2 If the subcontractor will be performing tasks on multiple days then a daily activity plan or equivalent is required each day.
- 7.1.3 Consult the manufacturer's instructions to confirm that the vacuum equipment is designed for the particular transfer operation.
- 7.1.4 Ensure that vacuum trucks, equipment, and loading/off loading sites are inspected prior to beginning the work to assure safe operations.
- 7.1.5 Emergency evacuation procedures must be reviewed with all team members prior to beginning the work each day.
- 7.1.6 Monitor tank-level indicators to avoid overfilling and over-pressurizing receiving tanks or creating excessive vacuum in supply tanks.
- 7.1.7 Run vacuum hoses out of walking and working areas if possible to avoid tripping on hoses and to avoid injuries due to movement of the hoses (can jump if there is a blockage). If hoses must be run in a walkway, then they must be secured so that they can't move unexpectedly. Avoid running hoses through doorways that are used for access.
- 7.1.8 Set up equipment to minimize spills. Follow the site spill plan if a spill occurs. Consider using collapsible drive on containment underneath the trucks.
- 7.1.9 Noise levels can be very high around these trucks. The noise level at the operator's control panel is likely to exceed 85 dB and the levels in other areas around the vehicle will be even higher. Noise levels can still equal or exceed 85 DB up to 300 feet away. In addition, the noise levels around the vacuum hoses can easily exceed 85 dB especially where the hose changes diameter. Ensure the operators and other personnel in the area are adequately protected from the noise. To protect team members from the noise, keep all unnecessary team members outside of the high noise areas. Use noise monitors to determine the limits of the high noise areas if a monitor is available. In all cases, remind team members to follow the rule of thumb for noise: If you have to raise

your voice to carry on a conversation with the person beside you, then the noise level is at or above 85 dB.

7.2 Potential Hazards

Vacuum truck owners and operators, must be aware of the numerous potential hazards associated with vacuum truck operations in petroleum facilities, including but not limited to:

- Sources of ignition
- Flammable atmospheres
- Potential hazards associated with the surrounding area
- Toxic vapors and their PEL's and STEL's including hydrogen sulfide (H₂S)
- Hazards of mixing of materials
- Slips, trips, and falls
- Spills and releases
- Fires and explosions
- Accidents within the facility or on the highway
- Suction at the end of the hose
- Inadvertent movement of hoses in walking or working areas
- Noise
- Body position and ergonomics when handling the hoses
- Working in confined spaces

7.3 Permits

Before beginning operations, vacuum truck operators shall obtain any permits required by the client. If the client does not require permits, it is recommended that we require a hot work permit for operations involving flammable liquids and potentially flammable atmospheres prior to bringing the truck into the area.

7.4 Flammable and Toxic Vapors and Atmospheric Testing

7.4.1 The areas where vacuum trucks will operate must be free of hydrocarbon vapors in the flammable range.

7.4.2 The areas where the vacuum truck operator and others work without respirators must also be at or below air - contaminant PEL's/STEL's.

7.4.3 If there is any question whether the area is vapor-or toxic gas free, atmospheric testing shall be performed by a qualified person using properly calibrated and adjusted detectors. Testing shall be conducted prior to starting any operations, and if necessary, during operations, including but not limited to the following: When operations in the area are subject to change such as automatic pump start-up or product receipt into, or transfer out of, a tank located in the vicinity of the transfer operations; when off-loading; when atmospheric conditions change such as wind direction, when an emergency situation, such as product release, occurs in within the facility that may affect atmospheric conditions in the transfer area.

7.4.4 Maintain a log of transported fluids and any potential residue to identify any possible chemical reactions from mixing.

7.5 Use of Conductive Hoses and Materials

Vacuum hose constructed of conductive material or thick walled hose with imbedded conductive wiring, shall be used when transferring flammable and combustible liquids when the potential for a flammable atmosphere exists in the area of operations. Conductive hose shall provide suitable electrical conductance less than or equal to 1 mega ohm per 100 feet (as determined by the hose manufacturer). Thin walled metallic spiral wound conductive hoses should not be used because of the potential for electrical discharge through the thin plastic that covers the metal spiral.

7.6 Bonding and Grounding

7.6.1 The complete vacuum transfer system needs to be bonded so that there is a continuous conductive path from the vacuum truck through the hose and nozzle to the tank or source container and grounded to dissipate stray currents to earth (ground).

- 7.6.2 Always ground the truck. Prior to starting transfer operations, vacuum trucks need to be grounded directly to the earth or bonded to another object that is inherently grounded (due to proper contact with the earth) such as a large storage tank or underground piping. A safe and proper ground to earth may be achieved by connecting to any properly grounded object including but not limited to any one or more of the following examples: a metal frame of a building, tank, or equipment that is grounded. An existing facility grounding system such as that installed at a loading rack. Fire hydrants metal light posts, or underground metal piping with at least 10' of contact with earth. A corrosion free metal ground rod of suitable length and diameter (approximately 9' long and 5/8-in. diameter), driven 8' into the earth (or to the water table, if less).

7.7 Venting

Under normal conditions, the absence of oxygen minimizes the risk of ignition in a vacuum truck. However, operating rotary lobe blowers and vacuum pumps at high speeds creates high air movement and high vacuum levels, resulting in high discharge air temperatures and high discharge vapor concentrations that can present potentially ignitable conditions. In addition, inadvertent mixing of chemicals can occur in the truck which can produce toxic or flammable vapors.

- 7.7.1 The following methods can be used by vacuum truck operators to safely vent vacuum pump exhaust vapors:

- Locating the vacuum truck upwind of vapor sources and by extending the vacuum pump discharge away from the diesel engine air intake.
- Vapors may be returned to the source container using conductive and closed connections; vapors may be vented into the atmosphere to a safe location using a safety venture.
- Vacuum truck operators may provide vertical exhaust stacks, extending approximately 12' above the vacuum truck (or higher if necessary), to dissipate the vapors before they reach ignition sources or other potential hazards and personnel.
- Vacuum truck operators may attach a length of exhaust hose to the vacuum exhaust that is long enough to reach an area that is free from potential hazards, sources of ignition, and personnel. The hose should be preferably extended 50' downwind of the truck and away from the source of the liquids.

7.8 Manual handling of Hoses

When the hose is handled manually, you must have systems to protect from the suction created at the hose end.

- 7.8.1 Vacuum Release

- There are three release areas available with a truck, including a remote release, a manual release near the truck itself and an inline "T."
- The larger the diameter of the hose, the bigger the force you have. If a 27" hose gets stuck to your body it can be fatal.
- An inline "T" is the mechanical device placed in the hose near the suction end that kills the vacuum in the hose.
- Nearly every injury in our industry occurs because those devices aren't working or aren't operative. If all 3 are working, you won't have injuries. Inspect all devices before use.

- 7.8.2 Ergonomics and body position

Consider the following to reduce exposure to ergonomic hazards.

- Use mechanical means to handle hoses and equipment whenever possible.
- Get help to move hoses and equipment.
- Rotate workers between jobs that have different muscle group requirements.
- Train team members to work with their body in neutral positions.

7.9 Training

7.9.1 Vacuum truck personnel shall be:

- Trained in the safe operation of the vacuum equipment.
- Familiar hazards of the petroleum products, by-products, wastes and materials being transferred, aware of relevant government and facility safety procedures, the contents of this policy, and emergency response requirements.
- Contents of the MSDS's for the products they are handling.
- Trained in the use of required PPE for the products they are handling.
- All personnel shall leave the vacuum truck cab during loading and off-loading operations.
- When transferring flammable liquids or hazardous materials, vacuum truck operators shall remain positioned between the vacuum truck and the source or receiving tank, vessel, or container and within 25' of the vacuum truck throughout the duration. Vacuum truck operators shall monitor the transfer operation and be ready to quickly close the product valve and stop the pump in the event of a blocked line or release of material through a broken hose or connection;
- Remove any other source of ignition within at least 100' if the possibility of flammable vapors exists (depending on local procedures and atmospheric conditions of the truck, the discharge of the vacuum pump, or any other vapor source).
- Trained in the requirements of confined spaces if have to enter tanks, vessels, manholes, tank of the vacuum truck, etc.

7.10 Qualified Operators

Vacuum truck operators shall be trained and properly licensed in accordance with applicable regulations:

7.10.1 Vacuum trucks shall not enter into tank dike area until such areas have been checked/monitored and rendered safe.

7.10.2 Vacuum trucks cargo tanks shall be depressurized.

7.10.3 Vacuum truck operators must be aware of the effect of speeds, turns and the changing center of gravity.

7.10.4 Vacuum truck operators shall maintain proper distances when operating vacuum trucks inside facilities with restricted clearances.

7.11 Required Documentation

The following documentation must be obtained from the Vacuum Truck subcontractor prior to starting work. These requirements are in addition to documentation required of all subcontractors such as proof of insurance and a written safety program.

7.11.1 A hazard analysis/JHA for Vacuum truck operations.

7.11.2 Proof of Training for hazards associated with the operation of vacuum trucks including the possibility of both flammable and toxic atmospheres.

7.11.3 Proof of training and/or certification for the Truck Operator.

7.12 Waste Disposal

7.12.1 Identify the generator Owner, subcontractor, Cianbro Corporation if it is our waste.

7.12.2 Ensure the waste goes to the proper disposal facility.

7.12.3 Keep copies of all shipments. Send the originals to the Corporate HSE Manager if Cianbro is the generator.

8 Budget / Approval Process

8.1 All costs associated with this policy are the responsibility of the jobsite.

9 Related Documents

9.1 Documents available on Cianbro.net

Policy Number: 060**Authorized By:** Michael W. Bennett**Title:** Workplace Protection Program for Benzene**Effective Date:** 08/25/11Page 1 of 7

1 Status

1.1 Update of existing policy, effective 06/04/15.

2 Purpose

2.1 This document provides guidelines for achieving compliance with OSHA Benzene Standard (29 CFR 1910.1028). It is intended to supplement, not replace, a thorough understanding of the standard.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 None

5 Policy

5.1 This policy applies to all Team Members at job sites where they could be exposed to mixtures containing greater than 0.1% benzene, unless specifically exempted by the standard.

6 Responsibilities

6.1 The Manager of the job site is responsible for the implementation of this policy on the job site.

6.2 Corporate Safety is responsible for maintaining this document.

7 Workplace Protection Program for Benzene Index

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7.1 Plans

At each site where there is exposure to Benzene, an activity plan must be developed to address how to safely perform the work. The activity plan must be revised and reviewed based on changes in tasks, monitoring results, changes in exposure, etc. The activity plan shall be reviewed by all team members who may be exposed. In addition, this policy and procedure shall be made available to team members onsite.

7.2 Permissible Exposure Limits

Team Members shall not be exposed to an airborne concentration of benzene greater than 1 ppm as an 8-hour time-weighted average (TWA), or 5 ppm as averaged over any 15-minute period (short term exposure limit, or STEL).

7.3 Regulated Areas

Regulated areas will usually be established by the client. Any exceptions to this should be specifically agreed to with the client. If the Company is responsible for establishing a regulated area, signs shall be posted at all access points and be clearly demarcated with barricade tape or equivalent (as a minimum). The boundaries should be established with a direct-reading instrument whenever possible. Access must be limited to authorized personnel. At a minimum, authorized personnel will have received benzene hazard training and fit testing on any protective equipment they are required to wear.

7.4 Exposure Monitoring

7.4.1 Team Member exposure monitoring must be conducted at least once for each job classification in each work area that contains benzene. If the client does not conduct monitoring for Team Members, then the Company must do it.

- The number of samples required for a representative baseline depends on several factors, including:
 - Whether a “worst case” exposure can be monitored
 - The frequency of exposure-related tasks
 - The number of Team Members exposed
 - The nature of the work

7.4.2 The sampling must take into account the task being performed. Samples should be taken on days when Team Members are performing tasks with potential exposure to benzene, and a description of the tasks should be recorded on the sample sheet. Team Members should aim toward at least one sample per task, rather than per-job classification.

- If a full-shift sample exceeds 0.16 ppm and the exposure is believed to be related to a short-term task performed during the shift, then STEL sampling should also be conducted. For assistance with sampling or interpreting the results, contact the HSE Manager.

- The frequency of periodic sampling shall be determined by specifications outlined in the standard.
- Team Members must be notified of the results of their monitoring within 15 working days of the receipt of the results, using the Sample results form. Other Team Members who perform similar tasks should also be made aware of these results. Bulletin board posting or equivalent methods will be adequate.

7.5 Compliance Programs

All feasible engineering and administrative controls must be used to reduce the exposure to Benzene. These controls must be identified in the activity plan. They must be used even if they do not by themselves reduce the exposure to at or below the PEL. These controls must be in place prior to the work being done. At client facilities, we must understand what engineering and administrative controls the client has put in place to reduce the exposure.

7.6 Respiratory Protection

A site written respiratory protection plan must be in place and address selection of appropriate respirators based on the airborne levels of Benzene. Fit testing will be conducted initially and annually in accordance with one of the approved protocols in the procedure.

7.7 Protective Clothing

Generally, the Company will use the protective clothing specified by the client. Most impervious materials are adequate for incidental contact. However, tasks requiring total immersion or extended contact with the liquid may require more selectivity. Viton and polyvinyl alcohol (PVA) are the best materials for gloves, but both have specific drawbacks. Questions regarding selection of gloves and protective suits should be addressed to the safety specialist on site. In all cases, both eye protection and dermal (skin) protection must be provided if there is potential exposure.

7.8 Medical Surveillance

- Monitoring will identify tasks with potential exposure greater than 0.5 ppm of airborne benzene as an 8-hour TWA. If any Team Member performs these tasks for at least 30 days per year, then he or she is required to be enrolled in a medical surveillance program. Exposure to greater than the PEL (1 ppm 8-hour TWA or 5 ppm STEL) for more than 10 days per year also requires medical surveillance.
- The initial exam must be conducted prior to assignment to a job, which involves the exposure level and frequency described above. The exam must include an occupational history, which should be done on the form in the "Benzene — Related Medical History" section and presented to the physician for review.
- The exam also includes blood tests. There will be a delay between the time the blood is drawn and the time the results are received. If the Team Member must be brought onto the job site before the results are received, do not allow him or her to work with benzene until medical clearance is obtained.
- Pulmonary function testing is required by the standard if respirators will be worn for at least 30 days per year. For the Company's purposes, pulmonary function shall be done on all initial benzene physicals.
- Emergency exams, including a urinary phenol test, are required if Team Members are exposed to benzene in an emergency situation. The standard defines emergency as "any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which may or does result in an unexpected, significant release of benzene." Additional insight can be gained from the urinary phenol limit of 75-mg/liter set by OSHA. This represents an exposure level of approximately 10 ppm as an 8-hour time-weighted average or 4800 ppm/min (480 min x 10 ppm). (The average is American Conference of Government Industrial Hygienists (ACGIH) Documentation of Threshold Limit Values, 1986, BE 1-4, Table 1.) This standard can be used as a guideline for determining if testing is needed. For example, if an unprotected Team Member was exposed to 50 ppm for one hour, this would represent 3000 ppm/min (50 ppm X 60 min) and would probably not be considered an emergency.

- In the event of an emergency exposure, urine samples may be collected on site at the end of the shift and sent to the clinic. There is no need to send the Team Member to the doctor unless he or she is exhibiting symptoms of overexposure. Arrangements should be made in advance for a laboratory or clinic to perform the analysis and method of transporting the samples. Sample guidelines are included in the "Guidelines for Evaluation of Emergency Exposure to Benzene" section. Because several over-the-counter drugs may increase urinary phenol levels, a "Questionnaire and Release Form" should be completed by the Team Member at the time the sample is given.
- The standard requires that certain information be provided to the physician. Contact OMC for help with this.

7.9 Communication of Hazards

7.9.1 Team members shall receive (in addition to basic hazard communication training) documented training prior to starting work on a project where they will be potentially exposed to Benzene. The training must be job specific and should address the following:

- Locations where benzene is used in a host facility and any client requirements relating to benzene.
- The provisions of site specific contingency/emergency plans.
- How to recognize tasks that might result in occupational exposure to benzene.
- How to limit exposure by using work practice and engineering controls.
- How to obtain information on the types, selection, proper use, location, removal, handling, decontamination and disposal of PPE; and
- Who to contact and what to do in an emergency.

7.9.2 Retraining should be conducted annually, regardless of exposure levels.

7.9.3 Subcontractors who may be exposed to benzene must be informed of the presence of benzene and the existence of the OSHA standards as part of the written contract. The subcontractor should provide Cianbro with a list of Team Members who have been trained and fit tested (if necessary) according to the standard. Cianbro should not conduct the actual training or fit testing for anyone other than its own Team Members unless approved by the Vice President of HR and Safety.

7.10 Record Keeping

7.10.1 Records of fit tests, medical surveillance, and sampling results must be kept for 30 years after the team member leaves Cianbro. Training records must be sent to the Cianbro Institute to be entered into the system.

7.10.2 If the client conducts the monitoring, the Company must receive copies of sample data sheets or summaries that contain at least the following information:

- Date
- Duration
- Results
- Descriptions of sampling and analytical method
- Description of type of respiratory protective devices used (if any)
- Name and social security number of Team Member
- Job classification of Team Member
- Description of type of work

7.11 Observation of Monitoring

Team Members will normally observe monitoring as part of their routine jobs. When conducting monitoring, the person doing the sampling should explain the purpose of what he or she is doing and briefly describe the procedure to the Team Members involved.

8 Budget / Approval Process

8.1 The job site is responsible for cost associated with this policy including all PPE required except for prescription safety glasses and safety toe boots.

9 Related Documents

9.1 Appendix A Benzene Awareness

Benzene Awareness

1.0 Introduction

Cianbro team members have the right to know about possible hazards that may be present in their work area(s) and how to protect themselves from such hazards. Our Hazard Communication Program provides a general overview of how such hazards must be managed at the jobsite. Some hazards are more common to certain activities and/or work locations and planning for possible team member exposures should be a daily process. In order to help project locations with planning and training processes relating to specific hazardous materials, this hazardous material awareness sheet has been created to address possible team member exposure to benzene.

Benzene is an aromatic hydrocarbon that is produced by the burning of natural products. It is a clear, colorless liquid with a pleasant, sweet odor. The odor of benzene does not provide adequate warning of its hazard. It is a component of products derived from coal and petroleum and is found in gasoline and other fuels. With this in mind, the most likely possible exposure to benzene for Cianbro team members is during the fueling of vehicles and other equipment and also from breathing vehicle and equipment exhaust fumes. Benzene is used in the manufacture of plastics, detergents, pesticides, and other chemicals. It is estimated that about half of the total population burden of exposure to benzene is from the 50 million people who smoke cigarettes. A smoker is exposed to 10 times the levels of benzene compared to the exposure of a non-smoker. Research has shown benzene to be a carcinogen (cancer-causing).

2.0 Permissible Exposure

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

3.0 Health Hazard Data

Benzene can affect your health if you inhale it, or if it comes in contact with your skin or eyes. Benzene is also harmful if you happen to swallow it. Effects of overexposure include;
Short-term (acute) overexposure - If you are overexposed to high concentrations of benzene, well above the levels where its odor is first recognizable, you may feel breathless, irritable, euphoric, or giddy; you may experience irritation in eyes, nose, and respiratory tract. You may develop a headache, feel dizzy, nauseated, or intoxicated. Severe exposures may lead to convulsions and loss of consciousness.

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

4.0 Precautions for Safe Use, Handling and Storage

Benzene liquid is highly flammable. It should be stored in tightly closed containers in a cool, well ventilated area. Benzene vapor may form explosive mixtures in air. All sources of ignition must be controlled. Use non-sparking tools when opening or closing benzene containers. Fire extinguishers, where provided, must be readily available. Know where they are located and how to operate them. Smoking is prohibited in areas where benzene is used or stored. It is also important to avoid gasoline and diesel fumes during fueling activities and to reduce team member exposure to exhaust fumes as much as possible.

5.0 Protective Clothing and Equipment

Respirators - Respirators are required for those operations in which engineering controls or work practice controls are not feasible to reduce exposure to the permissible level. If respirators are worn, they must have the National Institute for Occupational Safety and Health (NIOSH) seal of approval, and cartridge or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. If you experience difficulty breathing while wearing a respirator, you may request a positive pressure respirator. You must be thoroughly trained to use the assigned respirator, and the training will be provided by your employer.

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

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

6.0 Emergency and First Aid Procedures

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

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

Breathing - If you or any other person breathes in large amounts of benzene, get the exposed person to fresh air at once. Apply artificial respiration if breathing has stopped. Call for medical assistance or a doctor as soon as possible.

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

7.0 Training

Team members shall receive documented training prior to starting work on a project where Benzene is present. The training must be job specific and should address the following;

- Locations where benzene is used in a host facility and any client requirements relating to benzene.
- The provisions of site specific contingency/emergency plans.
- How to recognize tasks that might result in occupational exposure to benzene.
- How to limit exposure by using work practice and engineering controls.
- How to obtain information on the types, selection, proper use, location, removal, handling, decontamination and disposal of PPE; and
- Who to contact and what to do in an emergency.

Policy Number: 061**Authorized By:** Michael W. Bennett**Title:** First Aid Protocols**Effective Date:** 07/01/11Page 1 of 25

1 Status

- 1.1 Update of existing policy, effective 12/04/14.

2 Purpose

- 2.1 To provide guidelines for the provision of first aid to injuries and illnesses encountered while functioning as a Cianbro Safety Specialist.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Anaphylaxis: A serious, potentially life-threatening allergic response that is marked by swelling, hives, lowered blood pressure, and dilated blood vessels. In severe cases, a person will go into shock. If anaphylactic shock isn't treated immediately, it can be fatal.
- 4.2 Bacitracin Ointment: This medication is used to prevent minor skin infections caused by small cuts, scrapes, or burns. Bacitracin works by stopping the growth of certain bacteria.
- 4.3 Brachial Pulse: is felt over the brachial artery at the inner aspect of the elbow; palpated before taking blood pressure to determine location for the stethoscope.
- 4.4 Hands-Only CPR: Push hard and fast in the center of the chest to the beat of the classic disco song "Stayin' Alive." CPR can more than double a person's chances of survival, and "Stayin' Alive" has the right beat for Hands-Only CPR.
- 4.5 Hydrocortisone Cream: This medication is used to treat a variety of skin conditions (e.g., insect bites, poison oak/ivy, eczema, dermatitis, allergies, rash). Hydrocortisone reduces the swelling, itching, and redness that can occur in these types of conditions.
- 4.6 Hypertension: High blood pressure (hypertension) is a common condition in which the force of the blood against your artery walls is high enough that it may eventually cause health problems, such as heart disease.
- 4.7 Hypovolemic shock: An emergency condition in which severe blood and fluid loss makes the heart unable to pump enough blood to the body. This type of shock can cause many organs to stop working.
- 4.8 OMC: Occupational Medical Consulting
- 4.9 OTC: Over the Counter
- 4.10 Pre-Hypertension: Slightly elevated blood pressure is known as prehypertension.

5 Policy

- 5.1 Cianbro provides those first aid guidelines to the Safety Specialist in order to provide prompt, consistent and appropriate first aid to a team member in the event of an acute medical issue that occurs on-site. The basic premise of first aid administration is to prevent worsening of a given condition prior to accessing professional medical attention. The administration of first aid in the acute situation is not intended to delay or replace appropriate medical care.
- 5.2 At each site where medical assistance is not accessible within four minutes, there will be at least one person per shift available to render first aid (unless two or more are required by other Cianbro policies). Any person designated to provide first aid must have a valid certificate in first aid from the American Heart Association or equivalent (Red Cross or other). First aid supplies must be readily available and appropriate to the potential injuries.

6 Responsibilities

- 6.1 The corporate medical director or designee is responsible for providing approval for any deviations from the requirements contained in this policy.
- 6.2 The top Cianbro manager on the job site is responsible for the implementation of this policy on the project.
- 6.3 The corporate medical director is responsible for maintaining this document.
- 6.4 Safety specialists are required to review this document annually.
- 6.5 Safety specialists are responsible for procuring and maintaining first aid kits and blood borne pathogen kits. First Aid kits need to be checked at least weekly on each job to ensure that the expended items are replaced.

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7.1 Ice Packs

Depending on what types of activities team members engage in, they may be more susceptible to an injury such as twisting an ankle, knee, etc. first aid kits have chemical cold packs, but it is not as cold and may not work as well as ice and water. To make an ice pack put a mixture of ice and water in a Ziploc bag. When placing a bag of ice on an injury; it is important to place a towel between the ice and the injury.

7.2 Abdominal Injury

The abdomen is the area immediately under the chest and above the pelvis. It is easily injured because it is not surrounded by bones. The upper abdomen is partially protected in front by the lower ribs. It is protected at the back by the spine. The muscles of the back and abdomen also help protect the internal organs. Most important are the organs, which are easily injured or tend to bleed profusely when injured, such as the liver, spleen and stomach.

7.2.1 Some signals of serious abdominal injury include:

- Open wound in abdomen.
- Severe pain.
- Bruising.
- External bleeding.
- Nausea and vomiting (sometimes containing blood).
- Weakness.
- Thirst.
- Pain, tenderness or a tight feeling in the abdomen.

- 7.2.2 Care for abdominal injuries:
- Carefully position the victim on the back.
 - Do not apply direct pressure.
 - If organs are protruding, do not push organs back in.
 - Remove clothing from around the wound. Be sure to use appropriate personal protection.
 - Apply moist, sterile dressings over the wound (warm tap water can be used).
 - Cover dressings loosely with plastic wrap if available.
 - Cover dressings lightly with a folded towel to maintain warmth.
 - Do not give injured person anything to eat or drink.

- 7.2.3 CALL 911 and monitor ABC's.
- Is the Airway open?
 - Is the patient Breathing well?
 - Does the patient's Circulation seem OK?
 - (check skin color)
 - What is the patient's level of Consciousness?

- 7.2.4 Closed abdominal injury
Being hit hard in the chest or abdomen or falling can cause bleeding inside the body. You may not see physical signs of this bleeding, or you may see a bruise.

- A. Carefully position the victim on the back.
- B. Bend the victim's knees slightly. This allows the muscles of the abdomen to relax. If movement of the victim's legs causes pain leave the legs straight.
- C. Place rolled up blankets or pillows under the victim's knees.
- D. Call 911.
- E. Take steps to minimize shock, maintain normal body temperature and monitor the ABCs until EMS personnel arrive (see Hypovolemic Shock, Section 7.2.3).
 - Is the Airway open?
 - Is the patient Breathing well?
 - Does the patient's Circulation seem OK?
 - (check skin color)
 - What is the patient's level of Consciousness?

- 7.3 Abrasions
Skin that has been rubbed or scraped away.

- 7.3.1 Care for abrasions:
- Wash wound thoroughly with soap and water.
 - Control bleeding by direct pressure. (Be sure to use appropriate personal protection.)
 - Place Bacitracin ointment on the wound if no allergy known.
 - Apply sterile dressing.
 - Advise patient to follow up with their own doctor if problems occur or if greater than 10 years since the last tetanus shot.

7.4 Allergic Reactions

- 7.4.1 Common symptoms of mild allergic reaction include:
- Hives (especially over the neck and face)
 - Itching
 - Nasal congestion
 - Rashes
 - Watery, red eyes

- 7.4.2 First Aid for a mild to moderate reaction:
- Calm and reassure the person having the reaction, as anxiety can make symptoms worse.

- Try to identify the allergen and have the person avoid further contact with it. If the allergic reaction is from a bee sting, scrape the stinger off the skin with something firm (such as a fingernail or plastic credit card). Do not use tweezers; squeezing the stinger will release more venom.
 1. If the person develops an itchy rash, apply cool compresses and an over-the-counter hydrocortisone cream.
 2. Watch the person for signs of increasing distress.
 3. Get medical help, for a mild reaction, a health care provider may recommend over-the-counter medications (such as antihistamines).

7.5 Anaphylaxis

7.5.1 Anaphylactic shock is a severe allergic reaction. Air passages may swell and restrict the victim's breathing. Insect stings, food or medication allergies may cause anaphylaxis. Signals of anaphylaxis are:

- Rash.
- Feeling of tightness in chest and throat.
- Swelling of face, neck and tongue.
- Dizziness or confusion and
- Breathing difficulty which includes coughing and wheezing. This breathing difficulty can progress to an obstructed airway as the tongue and throat swell.

7.5.2 Care for anaphylaxis:

- Monitor breathing closely.
- Provide respiratory support as able.
- Call 911.
- Continue to provide respiratory support and reassurance for the victim.
- Observe for shock.

7.5.3 If past history indicates that there is evidence of severe allergic response(s), arrange for immediate transfer to a medical facility by calling 911 and perform the following:

- Monitor TM continually for any signs of a worsening reaction (see below).

If anaphylaxis signs are present and or the reaction is worsening to include markedly labored breathing:

- Check for medications such as an EpiPen or Benadryl. The person may carry either for allergic reactions.

7.5.4 If an EpiPen is available:

- Prepare the injection unit and press and hold against thigh for several seconds.
- Take off the safety cap. Always follow the instructions on the EpiPen.
- Hold the epinephrine pen in your fist without touching either end because the needle comes out one end.
- Push the end with the needle hard against the side of the person's thigh, about halfway between the hip and knee. Give the injection through clothes or on the bare skin.
- Hold the pen in place for about 10 seconds.
- Remove the needle from the leg, by pulling the pen straight out.
- Massage the insertion area for 10 seconds.
- Protect the airway. Turn the person on their side if vomiting.
- If TM carries Benadryl and level of consciousness allows administration, give 50Mg by mouth.

7.6 Amputation/Avulsion

In an avulsion, a portion of the skin or soft tissue may be partially or completely torn away. If a part of the body, such as a finger, toe, hand or foot is cut off (amputated) save the body part because doctors may be able to reattach it. You can preserve a detached body part at room temperature, but it will be in better condition to be reattached if you keep it cool.

7.6.1 Care

- Control bleeding. (Be sure to use appropriate personal protection.)

- Cover with sterile dressing.
- If you can find the amputated part, rinse it with clean water.
- Wrap amputated part in moist saline gauze.
- If the detached body part will fit, place part in Ziploc bag.
- Place bag in another Ziploc bag, which is mixed with ice and water, label it with the injured person's name, date and time.
- Amputated part must accompany victim to emergency treatment.
- Observe for shock.

7.7 Back Pain (non-specific)

There are many causes of back pain. Fractures, tumors, infections and disc herniation's occur uncommonly causing back pain, as do some internal illnesses. Most back pain in the workplace, however, originates in soft tissue (muscle, ligament, and tendon). Prompt appropriate medical intervention can minimize the duration of symptoms, speed functional recovery and prevent disability.

7.7.1 Care for non-specific back pain:

- Have team member stop performing any aggravating activities.
- If the injury is of acute onset ice may be applied to the area.
- Advise and arrange medical attention if pain persists.
- Advise follow-up with team members' provider.

7.8 Bite Wounds

7.8.1 Animal/human bites

A. Care:

- Wash thoroughly with soap and water.
- Advise follow up with medical provider with any problems or if it has been greater than 10 years since last tetanus shot.
- Consider assessment for possible exposure to rabies, depending on the animal involved. If unsure, check with local clinic provider. Notify team member as necessary.
- Note: It is critically important that a medical provider see all team members with human bites.

7.9 Insect bites

A. For mild reactions:

- Leave the area to avoid more stings.
- Remove the stinger, especially if it's stuck in your skin. Wash the area with soap and water.
- Apply cold packs or a Ziploc bag filled with ice and water to reduce pain and swelling.
- Ibuprofen (Advil, Motrin, others) or acetaminophen (Tylenol, others), may be used to ease pain from bites and stings.
- Consider a topical cream to ease pain and provide itch relief. Creams containing ingredients such as hydrocortisone or lidocaine may help control pain. Other creams, such as calamine lotion colloidal or creams with oatmeal or baking soda, can help soothe the bite area.
- OTC antihistamine (Benadryl, others) or chlorpheniramine maleate (Chlor-Trimeton, others) may help but do not take them before or during the performance of safety sensitive work as they can cause severe drowsiness.

Allergic reactions may be mild if the reaction includes nausea and intestinal cramps, diarrhea, or swelling larger than 4 inches (bigger than a baseball). See your doctor as soon as possible.

B. If past history indicates that there is evidence of severe allergic response to insect bites, arrange for immediate transfer to a medical facility by calling 911 and perform the following:

- Monitor TM continually for any signs of a severe reaction (see below).
- Check for any signs of a severe reaction (difficulty breathing, swelling of the lips/throat, faintness, confusion or dizziness, hives, rapid heart rate).

A. Symptoms of a severe reaction:

- Difficulty breathing.
 - Swelling of the lips/throat.
 - Faintness.
 - Confusion.
 - Rapid heart rate.
 - Hives.
 - Nausea, cramps, and vomiting.
- If signs are present, see anaphylaxis section.

7.10 Blisters

Care for blisters:

- Clean the area gently several times with antiseptic soap and water. (Use gloves.)
- Leave blisters intact if possible.
- Advise team member to see medical provider with any problems.
- Do what is necessary to eliminate subsequent trauma or contamination to the blister site.

7.11 Blood Pressure Protocol

Safety specialists are asked to take blood pressure readings for a number of reasons. Blood pressure abnormalities that are not job limiting, but are of health concern may be discovered by OMC on pre-placement exams, DOT exams, and medical surveillance exams and in other circumstances. Often the client will be referred by OMC to a medical provider for diagnosis and treatment. Some team members may have numbers suggestive of hypertension, and rarely of serious hypertension needing prompt intervention, on any one of the exams listed above. They often do not have a relationship with a primary care provider. These team members need more readings before OMC makes a determination of how to advise the team member to proceed or whether to be concerned about the initial readings at all. Often the only reliable means to do this is through safety specialists at work. This protocol will provide a guide for the safety specialist in how to take BP reading accurately and how to deal with BP readings discovered in these various scenarios.

7.11.1 Classification of non-emergent Blood Pressures

Categories for Blood Pressure Levels in Adults (in mmHg, or millimeters of mercury)

	Systolic (top number)		Diastolic (bottom number)
Normal	Less than 120	And	Less than 80
Pre-hypertension	120–139	Or	80–89
High blood pressure			
Stage 1	140–159	Or	90–99
Stage 2	160 or higher	Or	100 or higher

The ranges in the table apply to most adults (aged 18 and older) who don't have short-term serious illnesses.

7.11.2 Urgent Blood Pressure

- **Hypertension requiring intervention within days**
Blood Pressure at or near 180/110 should receive prompt outpatient attention.
- **Hypertensive emergency**
Any BP greater than 220/120, team members with these readings will require either hospitalization or urgent outpatient therapy to begin as soon as possible.

7.11.3 Devices for measuring pressure:

- Aneroid sphygmomanometers are the devices of choice.
- Automatic Blood Pressure devices are acceptable if they meet the British Hypertension Society standards and the AAMI standards for accuracy and are checked at least annually against a known accurate device(s) (Local clinic

measuring devices). Be sure to check this requirement before using or purchasing (require written confirmation by vendor) any such device to measure blood pressure for team members and be sure to document annual testing of the automated device.

7.12 Broken Bones and Sprains

Joint sprains happen when joints move in directions they're not supposed to go. Without an x-ray, it may be impossible to tell whether a bone is broken. If you are unsure, treat the injury as a broken bone. There may be swelling and the joint may turn slightly blue if it is sprained.

7.12.1 Care for broken bones and sprains:

- Get the first aid kit
- Wear PPE
- Cover any open wound with clean dressing.
- Put a plastic bag filled with ice and water on the injured area with a towel between the ice bag and the skin for up to 20 minutes.
- Call 911 if:
 - There is a large open wound.
 - The injured part is abnormally bent.
 - You're not sure what to do.
- If an injured body part hurts, the person should avoid using it until checked by a healthcare provider.

7.13 Bruises

This is a simple closed wound, which is also called a contusion. Bruises result when the body is subjected to force, such as when you bump your leg on a table or chair. This usually results in damage to soft tissue layers and vessels beneath the skin, causing internal bleeding when blood and other fluids seep into the surrounding tissues and the area discolors and swells. The amount of discoloration and swelling varies, depending on the severity of the injury.

7.13.1 Care for contusions

- Apply a cold compress or ice packs immediately and advise the team member to reapply up to 20 minutes in any one hour, every two-to-four hours, during the first 48 hours after the injury.
- Advise elevation of the injured part.
- Attempt rest of the injured part.
- Advise team member to seek medical care with any problems.

7.14 Burns

Burns are soft tissue injuries usually caused by heat. However, burns may also occur when the body is exposed to certain chemicals (e.g. lime dust, uncured concrete, acids, and caustics), electricity, solar or other forms of radiation. When burns occur, they first destroy the epidermis, which is the top layer of skin. If the burn progresses the dermis or the second layer is injured or destroyed. Burns break the skin and thus cause infection, fluid loss and loss of temperature control. Deep burns can damage underlying tissues. Burns can also damage the respiratory system and eyes. Many chemicals may cause burns to exposed skin. The chemical mechanism of injury is rarely thermal and is primarily by destructive reactions of skin building blocks such as fat and protein. Fortunately some basic First Aid treatment rules apply to all burns whether acid, caustic or heat. Suitable facilities shall be provided for quick flushing of eyes where any team member may be exposed to injurious corrosive materials.

The basic rule to remember in burn first aid is that "dilution is the solution to pollution." Large amounts of water are always appropriate. Rapid irrigation for a prolonged period limits tissue destruction. Other rules follow below.

7.14.1 Identify type and depth of burn:

- Superficial burns or first-degree burns involve only the top layer. The skin is red and dry and the burn is usually painful.
- Partial thickness or second-degree burns involve both the epidermis and the dermis. These are red and have blisters that may open and weep clear fluid, making the skin appear wet.

- Full thickness burns or third degree burns. This may destroy both layers of skin as well as any and all of the underlying structures such as fat, muscles, bones and nerves. These burns look brown or charred with the tissues underneath sometimes appearing white.

7.14.2 Critical burns include:

- Burns whose victims are experiencing breathing difficulty.
- Burns covering more than one body part.
- Burns to the head, neck, hands, feet or genitals.
- Any partial thickness or full thickness burns to a child or elderly person.
- Burns resulting from chemical exposure or electricity.

7.14.3 Care for burns

- Remove clothing from the involved area if possible.
- If the burning substance is a powder (e.g. lime dust), carefully brush as much off the skin as possible before irrigating copiously with water. Be careful not to brush it into contact with your skin or elsewhere.
- Irrigate with low-pressure flow of cool water for at least 20 minutes. Remember, if it is a chemical burn you are creating a dilute solution of the chemical so be sure you are washing it off the skin and not onto adjacent areas. Do not use ice or ice water. Use gloves during your treatment.
- For chemical burns, if burning persists following irrigation, repeat the process.
- Do not attempt to neutralize the chemical with another chemical. The exothermic reaction that may occur will make it worse.
- Cover the burned area with sterile, loose bandages.
- Advise the individual to seek medical care for tetanus immunization* if appropriate and any other problems or medical follow up when necessary.
- In cases of severe burns, minimize shock, monitor ABCs and call 911 to transport to emergency room (Please see Shock, Section 7.23).
- Seek medical attention as soon as possible but do not delay the irrigation process. The longer the chemical is in contact with the skin the worse the burn will be.
- Keep victim warm with blanket or coats while awaiting transport.
- Tetanus immunization should be repeated every 10 years.

7.15 Cardiac Emergencies (including chest pain)

7.15.1 Heart attack

Like all living tissue, the cells of the heart need a continuous supply of oxygen. The coronary arteries supply the heart muscle with oxygen-rich blood. If heart muscle tissue is deprived of this blood, it dies. If enough tissue dies, the heart cannot pump effectively. When heart tissue dies, it is called a heart attack. The heart attack interrupts the heart's electrical system. This may result in an irregular heartbeat and may therefore prevent blood from circulating effectively.

A. Signals of a heart attack

- Persistent chest, neck, jaw or upper back pain or discomfort and/or breathing difficulty.
- The skin may be pale or bluish in color or may be moist.
- The individual may be sweating profusely.
- There may be nausea and/or vomiting.

B. Care for a heart attack

- Look for and recognize the signs of a heart attack.
- If signs are present, immediately call 911.
- If no contra indication (known allergy to Aspirin, serious bleeding tendency or advice from a doctor never to take Aspirin) give victim one 325 milligram uncoated Aspirin and advise them to chew it, then swallow it.
- Convince the victim to stop activity and to rest.
- Help the victim to rest comfortably. Loosen clothing.
- Offer reassurance to the victim.

Cardiac arrest occurs when the heart stops beating or is unable to circulate blood. It can also occur when the heart is too weak to circulate blood effectively. Breathing soon ceases and in four-to-six minutes, without any intervention, brain damage is possible.

- C. Care for a cardiac arrest
 - A. Call 911 for advanced cardiac life support.
 - B. Monitor the ABC's.
 - Is the **A**irway open?
 - Is the patient **B**reathing well?
 - Does the patient's **C**irculation seem OK?
 - (check skin color).
 - What is the patient's level of **C**onsciousness?
 - C. Start CPR immediately.
 - D. Continue CPR until EMS personnel arrive.

7.16 Cerebral Vascular Accidents/Stroke

A stroke is a disruption of blood flow to a part of the brain that is serious enough to damage brain tissue. Most commonly, a stroke is caused by a blood clot. Another common cause is bleeding from a ruptured artery in the brain. Thus, commonly a tumor or swelling from a head injury may also compress an artery and cause a stroke.

7.16.1 Signals of a stroke

- The victim looks ill and may complain of feeling ill.
- Displays abnormal behavior.
- Sudden weakness and numbness of the face, arm or leg. Usually this occurs only on one side of the body.
- Difficulty talking or understanding speech.
- Vision may be blurred or dimmed. The pupils may be of unequal size. The person may also experience a sudden severe headache, dizziness or confusion or ringing in the ears. The victim may become unconscious or lose bowel or bladder control.
- Severe headache with no known cause.

7.16.2 Care of a stroke

If the victim is unconscious:

- Make sure the airway is open.
- Care for any life-threatening conditions that may occur.
- Position the victim on his/her side in order to allow any fluids to drain out of the mouth.
- Call 911.
- Monitor ABCs*.
 1. Is the **A**irway open?
 2. Is the patient **B**reathing well?
 3. Does the patient's **C**irculation seem OK?
 4. (check skin color)
 5. What is the patient's level of **C**onsciousness?

If the victim is conscious (a stroke may make the victim fearful and anxious):

- Call 911.
- Offer comfort and reassurance.
- Have the victim rest in a comfortable position.
- Do not give the victim anything to eat or drink.
- If the victim is having difficulty swallowing, place him/her on side to help drain any fluids from the mouth.

7.17 Convulsion/Seizure

When injury, disease, fever or infection disrupts the normal functions of the brain, the electrical activity of the brain becomes irregular. This irregularity can cause a loss of body control, known as a seizure. Seizures may be caused by an acute or chronic condition. The chronic condition is known as epilepsy.

7.17.1 Signals of a seizure

- Sometimes, before a seizure occurs, the patient experiences unusual sensation or feeling which alerts him/her to the fact that he/she may be having a seizure. This is called an Aura.
- Seizures may be mild blackouts that others may mistake for daydreaming or staring.
- There may be sudden uncontrolled muscular contractions lasting several minutes.

7.17.2 Care for a seizure:

- Do not try to stop the seizure.
- Do not allow victim to remain in upright position.
- Do not hold or restrain the person. Holding the person may cause musculoskeletal injuries.
- Protect the victim from injury (move tools or equipment that the person might strike during the seizure).
- Place a small towel or jacket under the person's head if it's easy to do so.
- Manage the airway (per your first aid instruction). If there is fluid in the mouth, position him/her on the side so the fluids may drain from the mouth. Do not try to place anything between the person's teeth.
- When the seizure is over, be reassuring and comforting. Stay with the victim until he/she is fully conscious and aware of surroundings and emergency medical care arrives. Check the ABC's.
 - Is the **A**irway open?
 - Is the patient **B**reathing well?
 - Does the patient's **C**irculation seem OK?
 - (check skin color)
 - What is the patient's level of **C**onsciousness?
- Call 911.

Although it may be frightening to see someone having a seizure, the most important aspect to remember is to protect the victim from injury by moving furniture, etc. away from the individual. Also, it is important to encourage and assist the team member with convulsive disorders to relay to his family and co-workers what to do if a convulsion occurs. Emphasizing to co-workers that emergency care consists essentially of protecting the person from self-injury will reduce some of the crowd hysteria which occurs during this type of medical problem.

7.18 Diabetic Emergencies

The condition in which the body does not produce enough insulin or when insulin is no longer effective, is called diabetes mellitus, or more commonly, sugar diabetes. The person with this condition is a diabetic. Anyone with diabetes must carefully monitor his/her diet and exercise and must regulate his/her use of insulin, if on insulin. When a diabetic fails to control these factors, he/she may have too much or too little sugar in the body and this imbalance causes illness. When the insulin level in the body is too low, the sugar level in the blood is high. This is called hyperglycemia. Sugar is present in the blood, but cannot be transported from the blood into the cells without insulin.

On the other hand, when the insulin level in the body is too high, the person has a low blood sugar. This condition is called hypoglycemia. The blood sugar level can become too low if the diabetic takes too much insulin, fails to eat adequately, over-exercises and burns off sugar faster than normal or experiences emotional stress.

7.18.1 Signals of diabetic emergencies

The signals of hyperglycemia and hypoglycemia differ somewhat, but the major signals are similar. These include the following:

- Changes in the level of consciousness including dizziness, drowsiness and confusion.
- Rapid breathing.
- Rapid pulse.
- Feeling and looking ill.
- Feeling weak, light headed.
- It is not important for you to differentiate between insulin reaction and diabetic coma. The basic care for both conditions is the same.

7.18.2 Care for diabetic emergencies

If the person is conscious:

- Obtain a history.
- Determine if the individual has taken his/her insulin, has failed to eat or perhaps experienced some great emotional stress or has had to do something very exerting. If the victim is conscious, give him/her sugar.
- Give foods that contain sugar such as:
 - Fruit juice
 - Milk
 - Sugar
 - Honey
 - A regular soft drink
- It's important to make sure that whatever you give has sugar in it. Diet foods and diet drinks don't have sugar; chocolate doesn't have enough sugar.
- If the person's problem is low sugar, the sugar will help quickly. If the person already has too much sugar, the excess sugar will do no further harm.
- Call 911.

If the person is unconscious:

- Do not give anything by mouth.
- Monitor the ABCs.
 - Is the **A**irway open?
 - Is the patient **B**reathing well?
 - Does the patient's **C**irculation seem OK?
 - (check skin color).
 - What is the patient's level of **C**onsciousness?
- Maintain normal body temperature.
- Call 911

7.19 Electrical Shock

DO NOT TOUCH THE VICTIM UNTIL THE ELECTRICAL CURRENT HAS BEEN TURNED OFF!

7.19.1 As soon as the victim is free of contact from current:

- Start CPR if indicated.
- Call 911
- Observe for further injuries such as burns, fractures, etc. and follow appropriate protocol.
- If a team member is exposed to electrical current, and there is any evidence of entrance and exit wounds, take them to a clinic or emergency room ASAP.
- If a team member is exposed to electrical current and there are no visible entrance or exit wounds, but they are showing signs of a problem, take them to a clinic or emergency room ASAP.
- If a team member gets a shock (small jolt with limited reaction such as jerking your hand back from the shock) and says they are shaken up but okay, then we should monitor them for signs of problems, but not necessarily take them to a clinic for medical evaluation. They must be monitored for the next 48 hours.
- Monitoring should include checking pulse and blood pressure regularly.

Effects of Amount of AC Current 60 Cycles/Second		
More than 3 mA		painful shock which can cause indirect accidents
More than 10 mA		muscle contraction, "no-let-go" danger
More than 30 mA		lung paralysis, usually temporary
More than 50 mA		possible ventricular fibrillation (heart dysfunction, usually fatal)
100 mA to 4A		certain ventricular fibrillation, fatal
Over 4 A		Heart paralysis, but may be temporary: severe burns. Usually caused by voltages above 600 V.

Note: Any electrical shock that causes “no-let-go” muscle contraction associated with any other symptomatology (shortness of breath, weakness, loss of consciousness) should be evaluated at the nearest medical facility immediately.

Remember that any shock that “flattens” a person or causes any significant degree of muscle contraction/rigidity warrants evaluation.

7.20 Eye Injuries

7.20.1 Injuries to the eye can involve the bone and soft tissue surrounding the eye or the eyeball. Blunt objects may injure the eye area or a smaller object may penetrate the eyeball. Care for open or closed wounds around the eyeball as you would for any other soft tissue injury. Injury to the eyeball itself requires different care. Injuries that penetrate the eyeball or cause the eye to be moved are very serious and can cause blindness. Never put direct pressure on the eyeball. Instead, follow these guidelines when providing care for major eye injuries.

- Place the victim on his/her back.
- Do not attempt to move any object impaled in the eye. If blood is present, use appropriate personal protection.
- Stabilize the impaled object and place as best you can. You can do this by using a fitted paper cup to support the object.
- Cover and close the unaffected eye to keep blood, dirt or fluid from entering.

Foreign bodies that get in the eye, such as dirt, sand or fibers, are irritants and may cause significant damage.

- First try to remove the foreign body by telling the victim to blink several times. This will produce tears that may help to flush out the object.
- Have the individual flush the eye briefly.
- If the object remains, the victim should receive professional medical attention.

Note: Flushing the eye with water is also appropriate if the victim has any chemical in his/her eye. The eye should be continuously flushed for at least 30 minutes. Advise patient to seek medical attention as soon as flushing is complete. Suitable facilities shall be provided for quick flushing of eyes where any team member may be exposed to injurious corrosive materials.

7.20.2 Flash burns of the eye:
The symptoms are acute pain, pain from light exposure, swelling, redness, marked tearing, and drainage.

7.20.3 Care for flashburns:
Refer to medical facility for care. Patient may be transported by car (not to drive).

- Inspect eyes for foreign bodies. Treat as above if present.
- Apply ice compresses.
- Refer to medical care immediately.

7.21 Fainting

Fainting is a partial or complete loss of consciousness. It is caused by a temporary reduction of blood flow to the brain. When the brain is suddenly deprived of its normal blood flow, it momentarily shuts down and the person faints. It may be triggered by an emotional shock. It may also be caused by pain, a specific condition such as heart disease or by over-exertion. Any time changes inside the body momentarily reduce the blood flow to the brain, fainting may occur.

7.21.1 Signals of fainting:

- Dizziness.
- Lightheaded.
- Cool, pale, moist skin.
- Numbness and tingling in the fingers or toes.

7.21.2 Care for fainting:

- A. Do not allow victim to remain in upright position.
- B. Elevate the victim's legs 8-12 inches.
- C. Loosen any restrictive clothing such as a belt, tie or collar.
- D. Check the ABCs
 - Is the **A**irway open?
 - Is the patient **B**reathing well?
 - Does the patient's **C**irculation seem OK?
 - (check skin color)
 - What is the patient's level of **C**onsciousness?
- E. Do not give the victim anything to eat or drink.
- F. Observe for shock.

Usually the victim of fainting recovers quickly with no lasting effects. However, you may not be able to determine whether the fainting is linked to a more serious condition. EMS personnel should be called immediately if there is any suspicion of a complicating problem such as hypovolemic shock.

7.22 Fractures and Dislocations

A fracture is a break or crack in the bone caused by a fall or direct or indirect blow to the part. Dislocation is displacement or separation of the bone from its normal position at a joint. Dislocations are usually caused by severe forces.

7.22.1 Common signs of fracture or dislocation:

- Deformity.
- Moderate or severe swelling and discoloration.
- Inability to move or use the affected body part.
- Bone fragments protruding from a wound.
- The victim feels bones grating or felt or heard a snap or pop at time of injury.
- Loss of circulation in an extremity.

7.22.2 Care:

- Rest the part.
- Ice.
- Elevation (if possible).
- Immobilization; avoid movement of the injured part.
- Arrange for medical attention immediately.
- Observe for shock.

7.23 Frostbite

Frostbite is the freezing of body tissues. Frostbite affects parts of the body that are exposed to the cold, such as fingers, toes, nose, and ears. Frostbite typically occurs outside in cold weather. But it can also occur inside if team members don't have gloves on and handle cold materials, such as gases under pressure. It usually occurs in exposed areas of the body depending on the air temperature, length of exposure and the wind. Signals of frostbite include lack of feeling in the affected area, skin that appears white, waxy or grayish yellow. The frostbitten area is cold, numb, hard, and the skin doesn't move when you push it.

7.23.1 Care for frostbite:

- Move the person to a warm place.
- Seek professional medical attention as soon as possible.
- If you are able to, remove tight clothing and jewelry from the frostbitten part.
- Remove wet clothing and pat the body dry. Put dry clothes on the person and cover the person with a blanket.
- Handle the area gently. Never rub an affected area.
- Warm the area gently by soaking the affected part in water no warmer than 100 to 105 F (lukewarm water).
- Avoid breaking any blisters. Cover the affected area. Bandage with a dry, sterile dressing.

7.24 Head Injury

Injuries to the head can affect the brain. Any significant force to the head can cause a concussion. A concussion is a temporary impairment of brain function which does not usually result in permanent physical damage to brain tissue.

7.24.1 Mechanism of injury:

Consider the cause of the injury to assist in determining when a head injury may be major or minor. Survey the scene and evaluate the following:

- Force of impact.
- Weight of the object striking the individual.
- Distance from point of impact.
- A fall from a height greater than or equal to the victim's height.

7.24.2 Signals of major head injuries:

- Changes in level of consciousness. (Do they respond to verbal stimuli? Painful stimuli?)
- Severe pain or pressure in the head.
- Unusual bumps or depressions on the head.
- Blood or other fluids in the ears or nose.
- Profuse external bleeding of the head.
- Seizures.
- Impaired breathing or vision.
- Nausea or vomiting.
- Persistent headache.
- Loss of balance- dizziness.
- Bruising of the head, especially around the eyes and behind the ears.

7.24.3 Preliminary action:

Determine the extent and severity of the injury and overall status of the victim.

- Monitor respiratory and circulatory status.
- Observe level of consciousness.
- Observe victim's communicability - garbled speech, confusion, check memory loss, and verbal responses etc.

7.24.4 Care for major head injuries (see signals of major injury above):

- Minimize movement of the head and neck.
- Maintain an open airway.
- Monitor consciousness and breathing.
- Control any external bleeding.
- Maintain normal body temperature.
- Call 911 for immediate transfer to the hospital emergency department.

7.24.5 Care for minor head injury: (no signals of major head injury)

- Cleanse wound and apply sterile dressing as needed to control bleeding.

7.25 Hypovolemic Shock

Shock is a condition in which the circulatory system fails to circulate oxygen-rich blood to all parts of the body. When vital organs do not receive oxygen-rich blood, they fail to function properly.

Shock may result from loss of body fluid from severe bleeding, for example, or from hypoglycemia, anaphylaxis, and severe damage to the heart or blood vessels, heat stroke, severe infection, drugs or poisoning. Someone with shock may stop responding. In adults shock is most often present if someone loses a lot of blood that you may or may not be able to see, has a severe heart attack or has a severe allergic reaction.

7.25.1 Signals of shock-All need not be present

- Restlessness or irritability.
- Rapid or weak pulse.
- Rapid breathing.
- Pale or bluish, cool moist skin.

- Excessive thirst.
- Nausea and vomiting.
- Feel weak, faint, or dizzy.
- Drowsiness or loss of consciousness.
- Hypertension.

7.25.2 Care for shock:

- Call 911 immediately--a victim of shock requires advanced life support.
- Help the person lie on their back.
- Monitor airway, breathing or circulation problems and vital signs.
- Control any external bleeding to minimize blood loss. Use appropriate personal protection.
- Cover the person with a blanket to keep him/her warm.
- Elevate legs about 12 inches to keep blood circulating to vital organs unless you suspect head, neck or back injuries, or possible fractures of the hips or legs. In this case, keep victim lying flat.
- Do not give victim anything to eat or drink even though he/she is likely to be thirsty. The victim's condition may require surgery, in which case an empty stomach is more appropriate.
- If the person needs CPR. Give CPR. If you don't know how, give Hands-Only CPR.

Remember that shock is a very serious, potentially life-threatening condition and the key to effectively manage the problem is to call 911 immediately to start advanced life support.

7.26 Lacerations

Lacerations are a slice or tear in the skin or mucosa. This usually occurs from contact with sharp objects, machinery or from trauma to an area during a fall.

7.26.1 Care for lacerations:

Control bleeding by using pressure and elevation. Apply direct pressure by placing a sterile dressing over the wound. Use appropriate personal protection.

Urge victim to seek medical attention promptly if:

- Opening which is over 2 cm in length or is estimated to be ½ to one cm in depth.
- Opening has gaping or jagged edges.
- Embedded material is present.
- A cut producing a flap, a cut to fingers, hands, toes, and feet or over joints is present that meets the above criteria of the length and depth.
- Laceration caused by human or animal bite.
- Laceration is on the face.
- Laceration has caused a functional disturbance. (e.g. finger won't bend or is weak - implies tendon laceration)
- The bleeding won't stop.
- Gross contamination is present.

7.26.2 Minor lacerations and scratches may be treated as follows:

- Wash wound thoroughly with soap and water.
- Place a sterile dressing over the wound.
- Using gloves apply direct pressure for a few minutes to control bleeding if necessary.
- Once bleeding is controlled, remove the dressing and apply Bacitracin if no allergic history.
- Apply a new sterile dressing.
- Advise team member to seek medical attention with any problems.

7.27 Nosebleeds

With nosebleeds it's sometimes hard to tell how much bleeding there is because the injured person often swallows some of the blood. This may cause the person to vomit. Bleeding from the nose may be caused by trauma to the nose or head, a vascular or bleeding disorder, drying of mucous membranes, high altitudes, drugs or occupational exposure. Nosebleeds are not generally related to blood pressure.

7.27.1 Care for nosebleed:

- Wear PPE
- Press both sides of the nostrils while the person sits and leans forward.
- Place constant pressure on both sides of the nostrils for a few minutes until the bleeding stops.
- If bleeding continues, press harder.
- Call 911 when:
 - You can't stop the bleeding in about 15 minutes
 - The bleeding is heavy, such as gushing blood.
 - The person has trouble breathing.

7.28 Puncture Wounds

A puncture wound results when the skin is pierced with a pointed object such as a nail, a piece of glass, a splinter or a knife. Although puncture wounds generally do not bleed profusely, they are potentially more dangerous than wounds that do because they can more readily become infected. Objects penetrating the soft tissues carry microorganisms that cause infections.

7.28.1 Care for puncture wounds:

- Clean area with soap and water.
- Apply Bacitracin ointment if no known allergy.
- Apply sterile dressing.
- Advise patient to seek medical care for tetanus* if appropriate or any problems.
- Tetanus immunization (DT) should be repeated every 10 years.

7.29 Spinal Injury

When you give first aid care to someone with a possible spine injury, you must not bend, twist, or turn the head or neck unless it's absolutely necessary to provide CPR or if you need to move the person out of danger. All suspected spinal injuries (such as from a fall) should be handled as fractures or dislocations.

7.29.1 Care:

- Minimize movement of head or spine by holding the head and neck.
- Call 911 to transport to emergency room.
- Maintain an open airway.
- Monitor consciousness and breathing.
- Control external bleeding.
- Maintain normal body temperature.
- *Do not move or reposition the worker unless absolutely necessary. Make every effort to stabilize the spine if movement is mandatory.*

Note: See Person Down Evaluation/ Response Protocol 9.3 Appendix. C.

7.30 Splinters or Slivers

Splinters or slivers are foreign bodies that have penetrated the soft tissue and remain imbedded in the open wound. Objects penetrating the soft tissue carry microorganisms that cause infection.

7.30.1 Care for splinters:

- Cleanse the area with soap and water, carefully inspecting to evaluate the depth imbedded and the size, determining status of tetanus immunizations in all cases. Small superficial splinters and slivers that are lodged superficially under the skin and easily accessible may be removed with forceps if available. Wash area with soap and water after removal.
- If unable to easily remove, advise prompt medical attention.
- All patients with large or imbedded splinters or slivers should be advised to seek medical care as soon as possible. Preventing infection is crucial in cases of imbedded objects. The longer the object remains as a foreign body in the soft tissue, the more risk of infection.

7.31 Tooth Injuries

A person with a mouth injury may have broken, loose, or knocked-out teeth. This can lead to a choking hazard.

7.31.1 Care of Tooth Injuries:

- Wear PPE
- Check the mouth for any missing teeth, loose teeth, or parts of teeth.
- Clean the wound with saline or clean water.
- If a tooth is loose, have the person bit down on a piece of gauze to keep the tooth in place and call a dentist.
- If a tooth is chipped, gently clean the injured area and call a dentist.
- Apply pressure with gauze to stop any bleeding at the empty tooth socket.
- Hold the tooth by the crown, not the tooth (the part that was in the gums. There may be ligaments on the tooth that will help reattach the tooth.
- If a tooth has come out, store the tooth in a cup of milk, clean water or between the cheek and gum if no liquid available and immediately take the injured person and tooth to a dentist or emergency room.

7.32 Patient Transport Guidelines

7.32.1 Mandatory 911 Transport:

- Moderate or severe respiratory difficulty.
- Chest pain.
- Uncontrolled bleeding.
- Symptoms of hypovolemic shock.
- Acutely painful condition that debilitates patient.
- Moderate to severe systemic allergic reactions.
- Electrical shock.
- Moderate to severe burns.
- Moderate to severe head injuries.

7.32.2 Non-Emergency Transport by other means:

- Mild to moderate strains, sprains.
- Lacerations where bleeding is controlled.
- Local crush injuries to extremity.
- Small, localized burns.
- Minor head injuries.
- Splinters, slivers.
- Foreign body, eyes.
- Flash burns, eyes.

7.33 Upper Extremity Pain

Upper extremity pain without obvious injury can be caused by heart disease, disc herniation in the neck and other problems with blood vessels and nerves. Most upper extremity pain in the work place is due, however, to overuse or repetitive motion type injuries.

7.33.1 Care for upper extremity pain:

- Have team member stop performing any aggravating activities.
- If the injury is of very recent onset ice may be applied to the area.
- Advise and arrange medical attention.

8 Budget / Approval Process

- 8.1 It is the responsibility of each jobsite to procure and provide all materials and PPE required and provide necessary training.

9 Related Documents

- 9.1 See attachments.

First Aid Kit

- | | |
|--|---|
| <input type="checkbox"/> Acetaminophen (individual box packets, i.e. Tylenol) | <input type="checkbox"/> Eye Wash Solution (6) |
| <input type="checkbox"/> Antiseptic Foam Hand Cleaner | <input type="checkbox"/> Gauze Wrap (2" rolls, 1 box) |
| <input type="checkbox"/> Antiseptic Wound Cleaner
<i>(Antiseptic Wound Cleaner should only be used if you cannot irrigate extensively with water or unless the wound is contaminated grossly. Note: They are all oxidative to the wound margins and can slow healing.)</i> | <input type="checkbox"/> Glucose Paste |
| <input type="checkbox"/> Aspirin (used for heart attacks only) | <input type="checkbox"/> Ibuprofen (individual box packets, i.e. Advil) |
| <input type="checkbox"/> Bacitracin Ointment (box-individual doses) | <input type="checkbox"/> Latest First Aid Protocols Safety Policy and Procedure |
| <input type="checkbox"/> Bandage Scissors | <input type="checkbox"/> Non Latex Gloves (exam type ok) |
| <input type="checkbox"/> Band-Aids (1" cloth) | <input type="checkbox"/> Package of Replacement One-Way Valves (1) |
| <input type="checkbox"/> Band-Aids (fingertip & knuckle cloth) | <input type="checkbox"/> Paper Dressing Tape (1") |
| <input type="checkbox"/> Blood Pressure Cuff | <input type="checkbox"/> Control Center Phone Number 1-800-222-1222 |
| <input type="checkbox"/> Blood Stopper Pads | <input type="checkbox"/> Saline Irrigating Solution (250cc) |
| <input type="checkbox"/> Burn Cream: Water-Jel | <input type="checkbox"/> Scrub Brush (for instruments) or a tooth brush |
| <input type="checkbox"/> Coban (1" & 2" rolls) | <input type="checkbox"/> Splinter Forceps (1 pair) |
| <input type="checkbox"/> Cold Pack (5 use ice if available) | <input type="checkbox"/> Sterile Dressing (4 x 4) |
| <input type="checkbox"/> CPR Protective Mask with One-Way Valve (2) | <input type="checkbox"/> Sterile Q-tips (small box) |
| <input type="checkbox"/> Emergency Blanket (1) | <input type="checkbox"/> Stethoscope |
| <input type="checkbox"/> Eye Contact Solution | <input type="checkbox"/> Syringes (20cc) to irrigate wounds |
| | <input type="checkbox"/> Thermometer |

Note: All safety specialists should have a stethoscope and be trained in the use of a standard sphygmomanometer blood pressure cuff. Automatic Blood Pressure devices are acceptable if they meet the British Hypertension Society standards and the AAMI standards for accuracy and are checked at least annually against a known accurate device(s) (Local clinic measuring devices).

First Aid kits need to be checked at least weekly on each job to ensure that the expended items are replaced.

Blood Borne Pathogen Kit

- Antiseptic Foam Hand Cleaner
- Biohazard Labels (4)
- Bleach (on hand but does not have to be in kit)
- Face Mask with Plastic Eye Shield (use goggles instead if available)
- Non Latex Gloves (exam type ok)
- Red Bags (4)
- Scrapers (2)
- Sharps Box (1 qt. container)

Person Down Evaluation / Response

**When a man is down, before further intervention:
Check ABC's (see below)**

Airway

- Air Exchanging Yes No
- If no, use jaw thrust to open airway
- DO NOT TIP HEAD BACK.

Breathing (look, listen, feel)

- If no, attempt ventilation Yes No

Circulation

- Pulse felt Yes No
- If no pulse and unresponsive
 - start chest compressions

Consciousness

- Awake, alert Yes No
- Responds to voice Yes No
- Responds to pain Yes No
- Unresponsive Yes No

Minimize movement of the head and neck

- (Maintain in line traction on head and neck) Yes No

Control any external bleeding with direct pressure Yes No

Call emergency for transport and further stabilization Yes No

When a person is down from other than a fall or major trauma: Check ABC's

Airway

- Air Exchanging Yes No
- If no, use jaw thrust to open airway
- DO NOT TIP HEAD BACK.

Breathing (look, listen, feel)

- If no, attempt ventilation Yes No

Circulation

- Pulse felt Yes No
- If no pulse and unresponsive
 - start chest compressions

Consciousness

- Awake, alert Yes No
- Responds to voice Yes No
- Responds to pain Yes No
- Unresponsive Yes No

Do not give victim anything to eat or drink (except in case of diabetic emergency)
Keep victim still and lying down until adequate evaluation/stabilization is complete (may require emergency response).

Call 911 for emergency response.

OSHA 300 Acceptable/Non- Recordable First Aid

- Nonprescription medication at non-prescription strength (Ex: Ibuprofen (200mg) 2 tablets)
- Tetanus shots
- Cleaning, flushing, or soaking wounds on the skin surface
- Wound coverage such as Band-Aids, gauze pads, and even Steri-strips and butterfly bandages
- Using hot or cold therapy
- Any totally NON RIGID (flexible) means of support (Ex: elastic bandages, wraps, etc.)
- Any temporary immobilization devices while transporting an accident victim
- Drilling fingernail or toenail to relieve pressure, or draining fluid from blisters
- Eye patches
- Simple irrigation or a cotton swab only to remove foreign objects not embedded in or adhered to the eye
- Simple irrigation, tweezers, cotton swab or other simple means to remove splinters or foreign material from areas other than the eye
- Finger guards
- Massage therapy
- Drinking fluids to relieve heat stress
- Liquid Band-Aid is acceptable, provided that medical documentation states clearly that it is used to protect and prevent infection and not for wound closure

DON'T FORGET

Work Days VS Calendar Days

In order to prevent an OSHA lost time all medical paperwork must flow in "calendar days". All documentation must show (even if not scheduled to work) that the employee had work capacity (i.e. restricted or full duty)

Example: If an employee has surgery on a Friday their M1 must give them work capacity or return to work status for the following day (Saturday), if it says return to work the following Monday, this is considered an OSHA 300 lost time

How to Take Blood Pressure with Aneroid Sphygmomanometer

- 1) Remove all but last layer of clothing which should not be thicker than a standard cotton shirt.
- 2) Legs uncrossed, feet flat on floor.
- 3) Optimally, 5 minutes of sitting quietly prior to measurement- several deep breaths (4 second inhale, 7 second breath hold and 8 second exhale) can reduce pressure.
- 4) Identify correct cuff size (must fall within marked range on standard cuff or use large cuff -if large cuff not available and required please note).
- 5) Open release valve on pump.
- 6) Locate the brachial pulse (search at medial third of elbow crease).
- 7) Apply cuff 1-2 inches above the elbow crease with the “artery” arrow pointing at the spot where you located the brachial pulse.
- 8) While applying cuff firmly be sure to “milk” out all the residual air in the cuff.
- 9) Place stethoscope into ears with the ear pieces facing forward (some stethoscopes may be neutral).
- 10) Support the arm at heart level.
- 11) Place diaphragm of stethoscope over brachial artery with light to medium pressure.
- 12) Inflate the cuff (when beginning your release you should have inflated the cuff to a level such that the initial travel of the pressure hand is smooth and you hear no sounds (see radial pulse pressure estimation or inflate to 170 in younger people or 180-200 in men over 40 and older persons).
- 13) Begin releasing the cuff at 2mm pressure increments per second
- 14) The first sound, which may be muffled, is the systolic reading
- 15) You may hear different gradients of sounds during the process but it is the very last sound you hear that indicates the diastolic pressure. This is often faint compared with earlier sounds
- 16) For approved automatic devices, follow suggested protocol.
- 17) Write down the TM’s blood pressure reading. Be mindful of saying the reading results out loud for privacy reasons.

Common Errors

- 1) Tight clothing on arm above cuff.
- 2) Arm out of position (pressure rises as arm is lowered from heart level).
- 3) Crossed legs can raise pressure.
- 4) Heavy pressure over brachial artery.
- 5) Rapid deflation of cuff- misses some heart beats.
- 6) Over inflation- Pain may spuriously elevate pressure.
- 7) Missing first subtle sound and recording first loud sound- misses true systolic pressure.
- 8) Pressing too hard when trying to find any pulse or when using the stethoscope.

- 9) Poor listening or noise conflict in measuring area.
- 10) Loose cuff or poor cuff fit.
- 11) Stethoscope not properly oriented in ears.

Using the radial pulse to determine how high to inflate the cuff

- 1) Locate the radial pulse- With palm up and the cuff in place, place your index and long fingers just to the outside of the stringy tendon at the medial wrist and just above the wrist crease.
- 2) Keep your fingers on the pulse as you inflate the cuff.
- 3) Note when the pulse disappears.
- 4) Deflate the cuff.
- 5) Now inflate the cuff to 20-30 points above your reading and measure pressure as above.

The 5 phases of sounds heard when measuring blood pressure - May not all be present or detectable

- 1) Faint repetitive tapping sound (systolic pressure).
- 2) Murmuring, swishing sound.
- 3) Loud repetitive knocking sound.
- 4) Muffled blowing sound.
- 5) Disappearance of sound (diastolic pressure).

What to do with elevated blood pressures

- 1) Report all blood pressure (BP) readings to OMC in a timely fashion. Please feel free to call with any questions.
- 2) If initial BP readings taken as per above protocol persist at levels at or near **160/90 (non-emergent hypertension)**, repeat 2 X daily for 2-3 days and inform OMC as pressures are taken. OMC will help the team member get to their primary care provider. No other intervention required.
- 3) If BP readings, even in the same session, persist at or near **180/110 (requires treatment within days)**:
 - Report these readings to OMC,
 - Remove the team member from strenuous activity and
 - Urge that they contact their primary care provider within 24-48 hours.
 - OMC will assist in locating and scheduling physician care for those without established primary care.
 - Blood pressure monitoring by safety specialists will be necessary during this period to determine safe return to full work capacity.
- 4) If BP levels approach or exceed **220/120 (hypertensive emergency levels)**:
 - Contact clinic for verification of pressure.
 - If pressures in this range are verified or if verification is not possible, have team member contact primary care immediately.
 - If primary provider cannot be reached or prompt evaluation is otherwise deferred, take team member to emergency department for evaluation.
 - Notify OMC.
 - Return to work BP monitoring may be necessary in this circumstance.

Blood Pressure Ranges

	Normal	Pre-hypertension	Hypertension Stage 1	Hypertension Stage 2	EMERGENT Hypertension
Systolic	<120	120-139	140-159	160-179	> or = 180
Diastolic	<80	80-89	90-99	100-109	> or = 110

1. Allow Team Member to settle in and become comfortable before taking their blood pressure (BP)--at least 10 minutes. Team Member should be sitting with legs uncrossed as you test him/her.
2. If initial BP is **120 to 139 or 80 to 89**, repeat the test once consecutively. If BP remains in the prehypertensive range, encourage Team Member to work with the Health Coach to adopt a healthy lifestyle and monitor BP.
3. If BP is **140 to 159 or 90 to 99** and persists at this Stage 1 level of hypertension when re-measured later in the day, advise Team Member to see doctor within 30-60 days, take medication as indicated, work toward doctor prescribed lifestyle changes, and utilize support of the Health Coach.
4. If BP at repeated measurements is **160 to 179 or 100 to 109**, the Team Member is presenting with Stage 2 hypertension. Advise Team Member to see doctor within 1 week, take medications as prescribed, work toward prescribed lifestyle changes, and utilize support of the Health Coach.
5. If BP readings are confirmed (repeated at least once 10-15 minutes later) at **>= 180 and or >=110**, The Team Member needs emergent medical attention especially if associated with symptoms like chest pain, shortness of breath, back pain, local numbness or weakness. Team Member should be followed up for medication compliance and lifestyle change support/referral to Health Coach.

Note: There are often no symptoms that present with emergent hypertension. If BP measures this high, urgent treatment is imperative as organ damage thru blood vessels to the organs with this level of pressure is imminent – the kidneys cannot take it. Could result in pulmonary edema, accompanying chest pain, stroke, aortic dissection.

Policy Number: 062**Authorized By:** Michael W. Bennett**Title:** Distracted Driving Policy**Effective Date:** 11/01/2012Page 1 of 7

1 Status

- 1.1 Update of existing policy, effective 02/14/14.

2 Purpose

- 2.1 To protect the health and safety of our Team Members and the Community by providing clear expectations to eliminate or mitigate the hazards of distracted driving.

3 Applicability

- 3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

- 4.1 Cognitive Distractions: Distractions that take your focus/mind off the complicated task of driving.
- 4.2 Distracted Driving: Any activity that could divert a person's attention away from the primary task of driving.
- 4.3 Driving: The operation of a motor vehicle. This includes being stopped at a stop sign or light and held up in traffic.
- 4.4 Hands-Free Driving: Holding the phone while driving is strictly prohibited. Hands-free means the use of mobile phone accessories such as Bluetooth technology and/or corded devices that allow you to use a mobile phone without holding it. Dialing or answering the phone while driving is prohibited and not considered hands-free unless using one of the mobile phone accessories described above.
- 4.5 Mechanical Distractions: Distractions that take your hands off the wheel.
- 4.6 Safe Parking Area: A safe location that is out of the way of traffic. (For example: the car is parked in a parking lot.)
- 4.7 Visual Distractions: Distractions that take your eyes off the road.

5 Policy

- 5.1 All Team Members driving for any purpose related to their Cianbro employment or utilizing company issued electronic communication equipment to conduct personal business while driving must be hands free while talking and are required to eliminate or mitigate distractions while driving. In addition, the use of personal cell phone or electronics on personal time while driving are not allowed on any Cianbro property, worksite, or designated Cianbro parking areas unless hands free. Furthermore, Cianbro strongly encourages all team members to apply these safe driving practices while at home.

6 Responsibilities

- 6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviations from the requirements contained in this policy.
- 6.2 All Cianbro Supervisors / Managers are responsible for the implementation of this policy.
- 6.3 All Cianbro Team Members are expected to abide by this policy.
- 6.4 The corporate safety department is responsible for maintaining this document.

7 Distracted Driving Index

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7.1 Cianbro Prohibits the Following Types of Distracted Driving

7.1.1 Texting

Text messaging creates a crash risk 23 times worse than driving while not distracted.

7.1.2 Any use of a cell phone's or smartphone's applications or features unless able to use hands-free.

7.1.3 Programming of a phone's applications, features, or any other electronic device is prohibited while driving. Example: GPS, computer, IPOD, MP3 Player, or similar devices. Your normal car controls, climate, radio, etc., are approved to be adjusted while driving.

7.1.4 Reading & Writing while driving is prohibited.

7.1.5 Eating a Meal & Personal Grooming

- Personal Grooming can be very distracting as you are usually looking at your task, not the road.
- Eating while driving is prohibited unless it is a snack like food or non-alcoholic beverage.

7.1.6 Use of CB's & Two-Way Radios

CB's & Two-Way radios are approved to be used while driving and/or operating equipment. It is encouraged when moving in congested areas that you pull over to a safe location to use these devices.

7.2 Statistics & Facts

7.2.1 Distracted driving is very serious. You not only put your own life at risk, you significantly increase the risk of putting others' lives at risk and/or serious injury or property damage.

7.2.2 Drivers who use hand-held devices are four times more likely to get into crashes serious enough to injure themselves.

7.2.3 According to a study done by the University of Utah, 98% of the public is incapable of performing two cognitively demanding tasks at once without incurring substantial costs in performance. Only 2% have the ability to multitask without performance problems.

7.2.4 Hands-free devices offer no safety benefits because they do not eliminate cognitive distractions.

7.2.5 Sending or receiving a text takes a driver's eyes from the road for an average of 4.6 seconds; the equivalent of driving 55 mph, the length of an entire football field, blind.

7.2.6 Using a cell phone while driving, whether it's hand-held or hands-free, delays a driver's reactions as much as having a blood alcohol concentration at the legal limit of .08 percent.

7.2.7 Driving while using a cell phone reduces the amount of brain activity associated with driving by 37%.

7.3 Additional Actions to Reduce Distracted Driving

7.3.1 Conduct your business or personal texts **prior** to starting your drive.

7.3.2 While traveling, if you need to use other features of your phone other than hands-free talking, safely pull over and stop in a safe parking area.

7.3.3 Do not call or text team members, family, or friends if you believe they are driving. If unsure, ask if they are driving and have them call you back when they are in a safe location.

7.3.4 If you are using a smart phone, consider adding an application that prevents the phone from ringing while you are driving.

7.3.5 If you are commuting with someone, offer to assist them with their communication needs or offer to drive.

7.3.6 Speak up if you see someone driving distracted.

7.3.7 Consider turning your phone off until you reach your destination or a safe intermediate point.

7.3.8 Programming of Electronics

Prior to starting your drive set up your electronics (GPS, IPOD, MP3 Player and any car controls such as climate, radio, etc.) If you need to adjust your electronics while on your commute, safely pull over and stop in a safe parking area.

7.4 Safety At Home

The hazards are the same whether you are at work or at home. Eliminate distractions whenever you drive and teach your friends and family to do the same. Lead by example and speak up when you see others allowing distractions to affect their driving.

8 Budget / Approval Process

8.1 Not Applicable.

9 Related Documents

9.1 See attachment. (National Safety Council's Distracted Driving Myth Buster)



Misconceptions persist about the dangers of talking on a hands-free cell phones while driving. Here are some of the most common myths:

Myth: A hands-free device eliminates the dangers of cell phone use while driving

FACT: Hands-free devices offer no safety benefits because they do not eliminate cognitive distraction. The brain cannot process two cognitively complex tasks at once and, as it switches from a cell phone conversation to driving and back again, the brain becomes so overloaded that drivers can miss seeing up to 50% of their driving environment.

Myth: If a driver's eyes are on the road at all times then he/she is safe

FACT: A driver may be looking at his or her driving environment while they are talking on a cell phone device. The problem is the driver looks but does not "see." Distracted drivers experience what researchers call inattention blindness – similar to tunnel vision. Drivers look out the window, but their brains do not process everything necessary to safely monitor their surroundings. It is because a driver talking on a cell phone is focused first on the cell phone conversation; the brain prioritizes the cognitive task of driving second.

Myth: Even if hands-free devices are dangerous, talking on a cell phone still is not the worst thing drivers can do behind the wheel

FACT: There are other activities that are more dangerous for drivers such as turning around to reach for an object in the back seat or rummaging through a purse. However, these distractions typically last just a few seconds because drivers realize the risk and the actions are short lived. Cell phone conversations often are longer because drivers do not realize they are cognitively distracted. The longer a call, the longer the exposure to risk. That is why cell phone use causes more crashes than more dangerous activities – because of the number of people engaged in the behavior at any given time.

Myth: If cell phone use while driving is cognitively distracting, then drivers also should not talk to other passengers

FACT: Some passenger conversations can be distracting to drivers such as intense conversations or arguments. But adult passengers often actively help drivers by monitoring and discussing traffic, and they tend to suppress conversation when the driving environment becomes demanding. Passengers can see the roadway; callers cannot.

Myth: Other drivers have problems talking on cell phones and driving, but I can handle it

FACT: According to a study done by the University of Utah, 98% of the public is incapable of performing two cognitively demanding tasks at once without incurring substantial costs in performance. Only 2% of people have the ability to multitask without performance problems, and they perform at an "extraordinary" level. These are the kinds of people you want as "Top Gun" pilots.

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Public Support

Public support for total cell phone bans has increased significantly. A 2011 AAA Foundation for Traffic Safety study found:

- 94 percent consider texting a very serious safety threat
- 87 percent feel cell phone use while driving causes distraction
- 88 percent feel drivers do not know how distracted they really are when using a cell phone
- 88 percent feel distracted driving can quickly lead to a crash

Sadly, while most drivers realize the dangers of cell phone distracted driving, many still engage in the behavior regardless of the perceived danger. Many drivers continue to operate under the assumption that "I can drive safely while using my phone, but other people cannot." This type of thinking can be deadly.

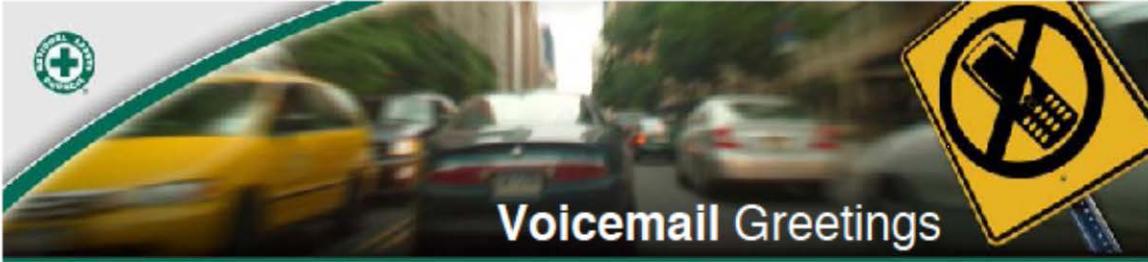
You can help

Everyone plays a role in making our roadways safer. Make a personal commitment to drive cell free, and if you have trouble doing so, use the technologies that are available to prevent cell use.

- Change your cell phone voicemail greeting to: "Hi, this is (name). I'm either away from my phone or driving. Please leave a message."
- Tell people who call you while they are driving that you value their safety and to call back when they are no longer driving
- Talk to family and friends about the dangers and encourage them to drive cell free
- Speak up when in the car with a driver who uses a cell phone while driving
- Let people who transport children know that they should not use their cell phones while driving. If they are not willing to drive without using a cell phone, arrange alternate transportation

The time has come for everyone to take personal responsibility for his or her safety and for the safety of others on our roadways.

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Script 1– Cell Phone Greeting

"Hello, this is _____ (name, title, company).

I am either away from my phone or I am driving, and, for safety reasons, I don't use my phone while driving.

Please leave your name, number and a brief message. I will return your call as soon as I am able.
(Optional addition if you are recording a greeting to communicate with callers while you are driving:
"I should be at my destination within _____ and will return your call then.")

Thanks so much."

Script 2 – Cell Phone or Work Phone Greeting

"Hello, this is _____ (name, title, company).

I am either on the phone or out of the office.

If you are calling on a cell phone while driving, please hang up and call me back when you are no longer driving.

Otherwise, at the sound of the tone, leave your name, number and a message. I will get back to you as soon as possible. Thank you."

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Policy Number: 063**Authorized By:** Michael W. Bennett**Title:** Ladder Safety**Effective Date:** 10/01/2013Page 1 of 7

1 Status

1.1 Update of existing policy, effective 09/04/14.

2 Purpose

2.1 To eliminate the potential for injury while erecting, inspecting or using any type of ladder.

3 Applicability

3.1 This policy applies to all work performed. Any deviation, unless spelled out specifically in the policy, requires the permission of the Vice President of Health, Safety, Environmental and Human Resources or the designee.

4 Definitions

4.1 None

5 Policy

5.1 Anyone working on a Cianbro project will comply with the guidelines set forth within this policy as well as all OSHA standards pertaining to ladder use.

6 Responsibilities

6.1 The Vice President of Health, Safety, Environmental and Human Resources or designee is responsible for providing approval for any deviations from the requirements contained in this policy.

6.2 All Cianbro Supervisors / Managers are responsible for the implementation of this policy.

6.3 The corporate safety department is responsible for maintaining this document.

7 Ladder Safety Index

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7.1 Ladder Inspection

7.1.1 All ladders must be visually inspected before use:

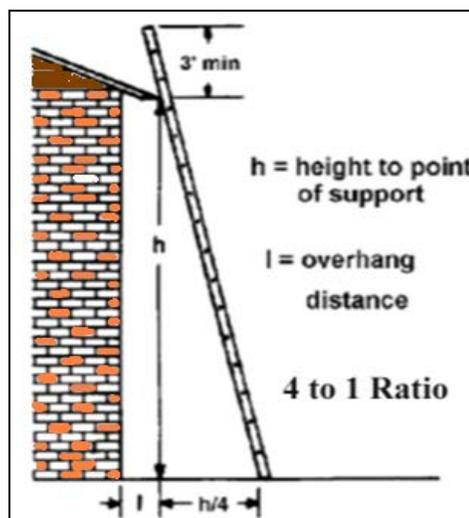
- Inspect ladders rails for cracks and splits.
- Inspect the steps and rungs for bends/breaks and ensure that the steps and rungs are tight and secure.
- Inspect the anti-slip ladder feet (pads) for damage, excessive wear, and material build up in the grooves.
- Confirm that all hardware and fittings are properly and securely attached.
- Test movable parts to see that they operate without binding or without too much free play.
- Ensure all surfaces are clear of grease, oil, wet paint, snow, and ice before climbing.
- Ensure all manufacturers' labels are legible.

7.1.2 Imperfect or defective ladders shall not be used. All defective ladders shall be tagged "Do Not Use" and removed from service.

7.2 General Ladder Safety

7.2.1 Safe Ladder Setup

- Check ladder capacity to ensure adequate for intended task
- All ladders must be placed on a stable base with anti-slip feet properly in place.
- Ladders must be tied off or footed when in use.
- Do not set ladders on boxes, blocks or other objects that might move.
- Do not use ladders in high wind or during inclement weather conditions.
- Never set up ladders in front of or around doors, unless the door is posted or locked. Use caution tape around perimeter of ladder in high traffic areas.
- Ladders must be used at the proper angle from a vertical surface of one foot horizontally for each four feet vertically. For a quick check on the angle of your ladder: Stand facing it with your feet touching the ladder feet and your arms extended—your palms should rest on a rung at shoulder height.



7.2.2 Climbing and Standing on Ladders Safely

- Always use three points of contact when climbing up or down. Hold onto the rungs of the ladder not the side rails as this provides a stronger grip if you start to slip.
- Always keep your belly button between the side rails of the ladder. If your belly button is outside the rails, you are at serious risk of tipping over and falling.
- Ladder rungs must be uniformly spaced and meet OSHA/ANSI specifications.
- Always face the ladder when climbing up or down.
- Do not carry materials or tools when climbing a ladder. Climb the ladder first then pull up the materials with a rope or have them flown up with a crane.
- Do not climb onto a ladder from the side.
- Do not slide down a ladder.
- Do not stand on the top rung or step of a ladder.

7.3 Ladder Use

7.3.1 The use of stairways, stair towers, scaffolding, ramps, or aerial lifts are preferred. Ladders are a last resort and shall only be used for the purpose for which they were designed.

7.3.2 Aluminum ladders are not allowed.

7.3.3 Job made wooden ladders are allowed as long as they meet the requirements of 1926.1053 including being able to support four times the intended load. Job made ladders must be constructed so that the horizontal rungs are recessed into the side rails or the spaces between the rungs on the side rails are filled with a spacer block. See Attachment 9.1

7.3.4 Reference Safety Policy and Procedure 026 Scaffold Safety is Everyone's Responsibility for requirements related to ladder use with scaffolding.

7.3.5 All barges require at least one ladder extending from the barge deck to the water level.

7.3.6 Steps or ladder access is required for accessing trucks or other equipment.

7.3.7 Team members climbing or descending from ladders may stop at any time while on the ladder for a short period of time so long as no work is going on and at least three points of contact is being made while stopped.

7.3.8 Tie-Off

- When use of a ladder is essential, team members must be 100% tied off when working on the ladder, over six feet (or four feet if working under general industry standards) unless they are climbing or descending facing the ladder with both hands free to securely grip the ladder rungs.
- Ensure tie off is above the work area to an acceptable anchorage point and consider using, fall block, retractable lanyard or a shorter lanyards (four feet), if necessary, so that no fall would be greater than six feet.
- Ensure fall will not result in hitting the floor/lower levels.
- If the ladder is set up near a potential fall hazard such as a hand rail, then fall protection is required when working at any height.
- Under no condition shall anyone free-climb to gain access to upper and lower levels unless they are 100% tied off to acceptable anchorage points or using an OSHA approved conventional system like a ladder.
- Free climbing must be considered as a last resort only when conventional systems (i.e. ladders, stair towers, aerial lifts, etc.) cannot be used.

7.4 Specific Ladders

7.4.1 Step Ladders

- Always open a stepladder completely and make sure the spreader bars are locked before use. Follow the manufacturer's requirements.
- Do not stand higher than the second step from the top of a step ladder.
- Do not straddle a stepladder.
- Only one person on a stepladder at a time unless it is designed for two.

7.4.2 Extension Ladders

- The sections of an extension ladder should overlap enough to retain the strength of the ladder. Follow the manufacturer's requirements.
- Never splice or tie two short ladders together.
- Secure the ladders rope so that it will not impede safe access and egress.
- Ladders must be used at the proper angle from a vertical surface of one foot horizontally for each four feet vertically on a stable base with the anti-slip ladder feet properly in place. For a quick check on the angle of your ladder: Stand facing it with your feet touching the ladder feet and your arms extended—your palms should rest on a rung at shoulder height.
- When using a ladder for access to an elevated level, it must extend 3 rungs or 3 feet above the level you are accessing.
- The top of an extension ladder should rest against a flat, firm surface.
- Elevate and extend these extension ladders only from the ground.
- Where the total length of a climb equals or exceeds 24 feet (7.3 m), 100% tie-off is required.
- The ladder must be tied off or footed when in use. When practical, secure extension ladders at both the base and the top.

7.4.3 Fixed Ladders

- Fixed ladders must be inspected prior to use.
- Where the total length of a climb equals or exceeds 24 feet (7.3 m), fixed ladders shall be equipped with one of the following:
 - A. Ladder safety climbing devices.
 - B. Self-retracting lifelines, and rest platforms at intervals not to exceed 150 feet (45.7 m).
 - C. A cage or well, and multiple ladder sections, with each ladder section not to exceed 50 feet (15.2 m) in length. Ladder sections shall be offset from adjacent sections, and landing platforms shall be provided at maximum intervals of 50 feet (15.2 m).

Note: Tie off is required if working from the ladder over six feet (four feet for general industry sites).

7.4.4 Specialty Ladders

- If specialty ladders are used for specific activities all of the general ladder safety requirements must be met as well as all manufacturer requirements.
- Team members must be trained to use the specific type of ladder.

7.5 Training

7.5.1 Each team member shall be trained by a competent person in the following areas, as applicable:

- Recognize hazards related to ladders and stairways, and the procedures to be followed to minimize these hazards.
- The nature of fall hazards in the work area.
- The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used.
- The proper construction, use, placement, and care in handling of all stairways and ladders.
- The maximum intended load-carrying capacities of ladders and

- The requirements of this policy and of OSHA Subpart X of the construction standards.

7.5.2 Retraining shall be provided as necessary so that the team member maintains the understanding and knowledge to safely use ladders and stairs.

7.6 **Safety At Home**

Ladder usage offers the same hazards whether you are at home or at work. Please follow the guidelines contained in this policy to help recognize and control hazards associated with safe ladder usage outside of work.

8 Budget / Approval Process

8.1 Not Applicable.

9 Related Documents

9.1 OSHA Fact Sheet – Safe Use of Job-made Wooden Ladders

OSHA[®] FactSheet

Reducing Falls in Construction: Safe Use of Job-made Wooden Ladders

Workers who use job-made wooden ladders risk permanent injury or death from falls and electrocutions. These hazards can be eliminated or substantially reduced by following good safety practices. This fact sheet lists some of the hazards workers may encounter while working on **job-made wooden ladders** and explains what employers and workers can do to reduce injuries. OSHA's requirements for job-made ladders are in Subpart X—Stairways and Ladders of OSHA's Construction standards.

What is a Job-made Wooden Ladder?

A job-made wooden ladder is a ladder constructed at the construction site. It is not commercially-manufactured. A job-made wooden ladder provides access to and from a work area. It is not intended to serve as a work platform. These ladders are temporary, and are used only until a particular phase of work is completed or until permanent stairways or fixed ladders are installed. A 24-ft. job-made ladder built to the American National Standards Institute (ANSI) A14.4-2009 non-mandatory guidelines is shown below.

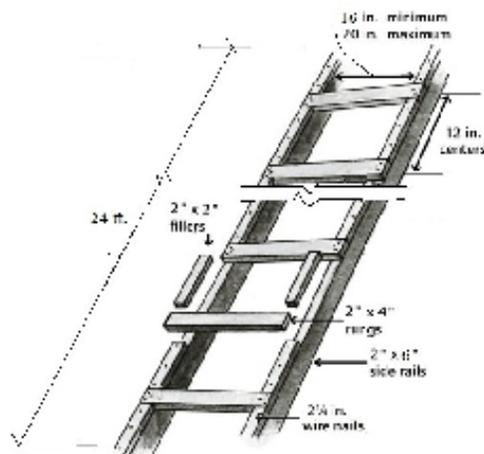


Figure 1: Single-Cleat Ladder

Training Requirements

Employers must provide a training program for employees using ladders and stairways. The training must enable each worker to recognize ladder-related hazards and to use ladders properly to minimize hazards.

Constructing a Safe Job-made Wooden Ladder

Side rails:

- Use construction-grade lumber for all components.
- Side rails of single-bleat ladders up to 24 ft. (7.3 m) long should be made with at least 2 in. (3.8 cm) x 6 in. (14 cm) nominal stock lumber.
- Side rails should be continuous, unless splices are the same strength as a continuous rail of equal length.
- The width of single-rung ladders should be at least 16 in. (41 cm), but not more than 20 in. (51 cm) between rails measured inside to inside.
- Rails should extend above the top landing between 36 in. (91.5 cm) and 42 in. (1.1 m) to provide a handhold for mounting and dismounting, and cleats must be eliminated above the landing level.
- Side rails of ladders which could contact energized electrical equipment should be made using nonconductive material. Keep ladders free of any slippery materials.
- Only put ladders on a stable and level surface that is not slippery.

Cleats:

- Cleats should be equally spaced 12 inches on center from the top of one cleat to the top of the next cleat.
- Cleats should be fastened to each rail with three 12d common wire nails which are nailed directly onto the smaller surfaces of the side rails.
- Making cuts in the side rails to receive the cleats is not advisable.
- Cleats should be at least 1 in. (2.5 cm) x 4 in. (8.9 cm) for ladders 16 ft. (41 cm) to 24 ft. (7.3 m) in length.

Filler Blocks:

- Filler should be 2 in. (3.8 cm) x 2 in. (3.8 cm) wood strips.
- Insert filler between cleats.
- Nail filler at the bottom of each side rail first. Nail the ends of a cleat to each side rail with three 12d common nails. One nail is placed 1-1/2 inch in from each end of the filler block.
- Nail the next two fillers and cleat, and then repeat. The ladder is complete when filler is nailed at the top of each rail.
- Make all side rails, rungs and fillers before the ladder is assembled.

Inspecting Ladders

- A competent person must visually inspect job-made ladders for defects on a periodic basis and after any occurrence that could affect their safe use.
- Defects to look for include: structural damage, broken/split side rails (front and back), missing cleats/steps, and parts/labels painted over.
- Ladders should be free of oil, grease and other slipping hazards.



**PLAN.
PROVIDE.
TRAIN.**

Three simple steps
to prevent falls.

Safe Ladder Use—DO:

To prevent workers from being injured from falls from ladders, employers are encouraged to adopt the following practices:

- Secure the ladder's base so that it does not move.
- Smooth the wood surface of the ladder to reduce injuries to workers from punctures or lacerations and to prevent snagging of clothing.
- Use job-made wooden ladders with spliced side rails at an angle so that the horizontal distance from the top support to the foot of the ladder is one-eighth the working length of the ladder.
- Ensure that job-made wooden ladders can support at least four times the maximum intended load.
- Only use ladders for the purpose for which they were designed.
- Only put ladders on stable and level surfaces unless secured to prevent accidental movement.
- Ensure that the worker faces the ladder when climbing up and down.
- Maintain a 3-point contact (two hands and a foot, or two feet and a hand) when climbing a ladder.
- Keep ladders free of any slippery materials.
- Maintain good housekeeping in the areas around the top and bottom of ladders.

Safe Ladder Use—DO NOT:

- Paint a ladder with nontransparent coatings.
- Carry any object or load that could cause the worker to lose balance and fall.
- Subject a job-made wooden ladder to excessive loads or impact tests.

OSHA standard: 29 CFR 1926 Subpart X—Stairways and Ladders

American National Standards Institute standard: ANSI A14.4-1979, ANSI A14.4-2009

Employers constructing job-made ladders must follow the ladder requirements set forth in 29 C.F.R. 1926 Subpart X. They are encouraged to consult the non-mandatory guidelines set forth in ANSI A.14.4-1979—Safety Requirements for Job-Made Ladders (referenced in Appendix A to Subpart X of Part 1926—Ladders) and ANSI A.14.4-2009—Safety Requirements for Job-Made Wooden Ladders.

State plan guidance: States with OSHA-approved state plans may have additional requirements for avoiding falls from ladders. For more information on these requirements, please visit: www.osha.gov/dcsp/osp/statesstandards.html.

Most OSHA offices have compliance assistance specialists to help employers and workers comply with OSHA standards. For details call 1-800-321-OSHA (6742) or visit: www.osha.gov/hm/RAmap.html.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For assistance, contact us. We can help. It's our mission.



U.S. Department of Labor

www.osha.gov 1-800-321-OSHA (6742)

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