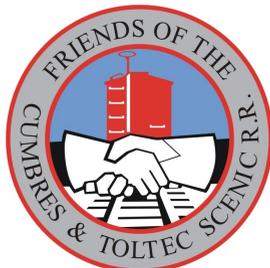


SAFETY & WORK RULES FOR VOLUNTEERS

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Railroad, Inc.

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THE FRIENDS HAVE AN EXCELLENT SAFETY RECORD.

THIS MANUAL WILL HELP CURRENT AND FUTURE VOLUNTEERS CONTINUE AND IMPROVE UPON THAT RECORD
TOWARD OUR ULTIMATE GOAL—

ZERO ACCIDENTS, ZERO INJURIES.

The Friends have adopted mandatory safety and work rules for Volunteers participating in historic preservation or other work on the Cumbres & Toltec Scenic Railroad (Railroad). When working on the Railroad, Volunteers are guests of the Cumbres & Toltec Scenic Railroad Commission (Commission), which represents the C&TS's owners, and its designated Operator, which is responsible for day-to-day Railroad operations. Volunteers are subject to all Railroad and Friends safety rules.

"SAFETY FIRST" GOVERNS EVERY RAILROAD ACTIVITY

Safety rules are intended to instill work and operating habits providing maximum safety to Volunteers, Railroad personnel, train passengers, and the general public. Any accident or injury is notice that something went wrong with our methods, materials, and/or personnel actions. Every accident must be reported and investigated to determine its cause and to determine changes needed to avoid a repetition.

Every Volunteer wishing to work on Railroad property will review Part 1. of these Safety and Work Rules, and by becoming a Volunteer acknowledges that they have read the Rules and agree to abide by them. Volunteers working on Projects or with equipment requiring advanced skills will, in addition to Part 1, review Part 2. of these rules, and must also read and agree to abide by them.

FRIENDS OF THE CUMBRES & TOLTEC SCENIC RAILROAD SAFETY COMMITTEE

The purpose of this Committee is to serve as a focal point for the development of plans, policies and procedures designed to enhance the effectiveness of Safety management activities in performance of our mission to the historic preservation, restoration and interpretation of the Cumbres & Toltec Scenic Railroad (C&TS) as a living museum, registered State Historic Site and National Landmark.

The goal is to promote Friends' members safety by serving as a clearinghouse to the organization for the coordination of safety program techniques, developments, effective safety practices, standards, development of safety processes, and advancement of safety program management for the Friends of the Cumbres & Toltec Scenic Railroad, Inc.

FRIENDS ACCIDENT REPORTING

As all of our members are aware, our work is an integral part of the Railroad and most importantly it is necessary for historic preservation of a National Landmark. In doing so it puts our members on Railroad property. While on Railroad Property the Federal Railroad Administration (FRA) requires that incidents/accidents that occur on the Cumbres & Toltec Scenic Railroad property must be reported in writing to the Safety Officer, General Superintendent, and Human Resources Manager as soon as possible. For that reason, if an accident/incident should occur, FRA Form 6180.98 will be used to record the accident/incident.

PROPER ACCIDENT/INCIDENT REPORTING ON THE C&TS

The first and foremost consideration in accident/incident reporting is the immediate protection of life and property. Call 911. This is the fastest way to report the accident and get emergency medical help on the way. Even if you think an injury is minor, call 911. Unless you're a physician, you may not recognize the potential signs of a more serious injury.

Any accidents/incidents that occur on Railroad property shall be communicated as soon as possible to the Train Dispatcher, and/or appropriate supervisors and management, in accordance with the Cumbres& Toltec Scenic Railroad Passenger Train Emergency Preparedness Plan (PTEPP). The proper procedures for making a written report of an accident/incident are outlined below.

Both insurance and Federal Railroad Administration regulations require that incidents/accidents that occur on Cumbres & Toltec Scenic Railroad property must be reported in writing to the Safety Officer, General Superintendent, and Human Resources Manager as soon as possible after an accident/incident occurs. In cases where the incident is considered a "reportable incident" under Federal Railroad Administration regulations, the deadlines for the General Superintendent to file a report to the FRA is very short. Failure to file such reports timely to the FRA can result in substantial monetary fines to Railroad.

The following are answers concerning proper filing of incident/accident reports.

Q: Where do I get the incident reporting forms?

A: Forms are available at in the Incident/Injury/Accident Report Forms folders located in both the Chama and Antonito depots and in prominent buildings. Supervisors and train conductors should carry a ready supply of these folders while on duty.

Q: What constitutes an accident/incident that requires a written incident report?

A: An incident report must be filed when ANY of the following events occurs:

- When ANY person sustains an injury on Railroad property that is deemed significant enough for the individual to require medical treatment.
- When ANY person becomes injured or sufficiently ill on railroad operated or contractually operated trains or buses that he/she must be evacuated from Railroad property. Any incident occurrence that causes significant damage to any railroad property or to any other person's property under the care of the Railroad or that is located upon Railroad property.

Q: What constitutes "medical treatment" that would require the utilization of an incident report?

A: Victim treatment by certified EMS personnel wherein medical procedure is performed, or prescription drugs are applied, dispensed, or prescribed to the victim an incident report must be completed. The report should also be utilized in circumstances wherein it is believed that medical treatment *may* be required, even if it is later determined that medical treatment was not necessary. If medical treatment, transport, or evaluation is declined, a "Declined Treatment, Transport, and/or Evaluation" form must be used.

Q: Who must file the incident reports and associated forms?

A: Whenever possible, incident forms, information statements, and other applicable forms should be completed by:

- The victim, if he or she is able to do so.
- Any employee who witnessed the incident.
- A non-employee who witnessed the incident, if no Railroad employee witnessed the incident.
- In cases of trains operating out on the railroad line (including incidents that occur at the Osier Dining Facility), the Conductor of the train.
- In cases of employee injuries, the injured employee's direct supervisor.
- The Safety Officer or Train Dispatcher, if either was responsible for notifying emergency personnel or was otherwise involved in coordinating response to the incident.

Q: How soon should the applicable reports be filed?

A: As soon as possible after the incident. In all cases, the applicable reports should be filed within 24

hours after occurrence of the incident.

Q: What information is needed for an Incident Report to be considered complete?

A: An Incident Report should answer the following basic questions:

- **Who** was involved in the incident? Victim information shall include name, mailing address, physical address (if different from mailing address), telephone number, e-mail address (if applicable), date of birth, gender, and birth date. Witness information shall include name, mailing address, physical address (if different from mailing address), telephone number, e-mail address. Employees shall also provide job title, and Social Security Number.
- **What** happened. This description should include both what happened in the incident, as well as what damage, injuries, etc. occurred.
- **When** the incident occurred. This should be as specific as possible. An example of an unacceptable description would be "on August 1, 2017"; an acceptable description would be "at 3:05 PM on August 1, 2017."
- **Where** the incident occurred. This should be as specific as possible. Example of an unacceptable location would be "Chama Depot"; an acceptable description would be "at the north end of the trackside Chama Depot platform."

INSTRUCTIONS FOR COMPLETING THE "RAILROAD EMPLOYEE INJURY AND/OR ILLNESS RECORD FORM" (FRA FORM 6180.98)

IMPORTANT: THIS FORM MUST BE USED FOR ANY INJURY SUSTAINED BY ANY PERSON ON RAILROAD PROPERTY - THIS INCLUDES EMPLOYEES, VOLUNTEERS, PASSENGERS, VISITORS OR TRESPASSERS. IF THE PERSON SUSTAINING THE INJURY IS NOT A RAILROAD EMPLOYEE, "NON-EMPLOYEE" MUST BE WRITTEN AT THE TOP OF THE FORM. THE FORM MUST BE FILLED OUT AS COMPLETELY AS POSSIBLE. CONDUCTORS SHOULD FILL OUT THE FORM IF THE INJURY OCCURRED TO A PASSENGER ON A PASSENGER TRAIN (INCLUDING SPECIALS AND CHARTERS), AT A DEPOT WHEN BOARDING OR EXITING A TRAIN, OR AT OSIER. FOR OTHER INJURIES, A SUPERVISOR, MANAGER, THE SHOP SUPERINTENDENT, OR THE SAFETY OFFICER SHOULD FILL OUT THE FORM.

SPECIFIC INSTRUCTIONS:

For non-employee injuries, Sections 1 through 17, 20 through 26, and 33 through 37 should be completed as soon as possible. Sections 38 through 44 should be completed by a supervisor, manager, the Shop Superintendent, or Safety Officer as soon as the information is known. Block 20, "Specific Site" should also include GPS coordinates (Dispatcher may provide).

For employee injuries, all sections of the form must be completed, with the exception of Sections 38

through 44.

The INFORMATION STATEMENT REGARDING INCIDENT, INJURY, OR ACCIDENT form should be completed by injured person (if possible), witnesses to the incident, any employee with involvement in the incident, and/or by the employee completing the RAILROAD EMPLOYEE INJURY AND/OR ILLNESS RECORD FORM. The Information Statement form(s) should be attached to Injury Record form when it is submitted as noted below.

Depending on the nature and severity of the injury, an injury to ~ person that occurs on Railroad property may require reporting it to the Federal Railroad Administration (FRA), and the report to the FRA must contain all of the information contained in the RAILROAD EMPLOYEE INJURY AND/OR ILLNESS RECORD FORM. The RAILROAD EMPLOYEE INJURY AND/OR ILLNESS RECORD FORM and the INFORMATION STATEMENT REGARDING INCIDENT, INJURY, OR ACCIDENT forms must be completed then provided to a supervisor, manager, the Shop Superintendent, and the Safety Officer as soon as possible, as acceptable reporting times to the FRA can be quite short.

PART 1.

BASIC SAFETY & WORK RULES FOR ALL FRIENDS VOLUNTEERS

I. GENERAL SAFETY & WORK RULES

★★★ SAFETY FIRST ★★★

IF IT CAN'T BE DONE SAFELY, DON'T DO IT!

A. **SAFETY COMPLIANCE.** Volunteers must comply with the Railroad and Friends' safety rules at all times when on Railroad property or in the course of performing any volunteer work for the Friends involving the Railroad. Volunteer attendance at Friends' safety meetings is mandatory. Failure to comply with Friends' or Railroad safety or operating rules may subject a Volunteer to discipline by the Operator and/or the Friends. In the event of a conflict between the Operator's and Friends' rules or directions, the Operator's prevail.

IF YOU ARE IN DOUBT OR HAVE QUESTIONS ABOUT THE MEANING OR IMPLEMENTATION OF ANY SAFETY OR WORK RULE, PLEASE ASK YOUR TEAM LEADER, THE SITE LEADER OR THE SAFETY OFFICER FOR CLARIFICATION.

B. **TEAM, SITE LEADER & SAFETY OFFICER RESPONSIBILITIES.** Team Leaders must know the safety rules governing the project they are directing and will provide safety briefings to their team daily during the project. Team and Site Leaders and the Safety Officer have the authority to redirect any Volunteer engaging in unsafe behavior. Together, Team Leader(s), the Site Leader, and the Safety Officer are the "SAFETY TEAM".

C. INJURY AND ACCIDENT REPORTING. Volunteers should immediately report any injuries, accidents or other safety incidents to their Team Leader, the Site Leader, or the Safety Officer. Whoever is notified of an incident is responsible for informing the other two managers as soon as possible. The Site Leader or Safety Officer will report the incident to the Railroad Dispatcher. The Site Leader must complete an Accident/Injury Report form. Current Forms are available from the Railroad Dispatcher or in blue folders located in pertinent buildings in Chama and in Antonito. The Site Leader shall provide a copy of each completed Accident/Injury Report to the Friends Albuquerque office, Attention: Tim Tennant, or successor.

D. A NEAR MISS is an accident or injury that almost happened, for example a piece of wood ejected from a saw due to improper safety precautions that mercifully hit the wall rather than someone's head. Like an actual accident or injury, a Near Miss is notice that something is seriously wrong. In the event of a Near Miss follow this procedure:

1. **IMMEDIATELY STOP** the work or activity that caused the Near Miss.
2. **PROMPTLY CONVENE A MEETING** of the Safety Team, the person doing the work or activity, and any other witnesses to the Near Miss.
3. **DETERMINE THE CAUSE** of the Near Miss and the **CORRECTIVE ACTIONS** needed to avoid a recurrence.
4. **IMPLEMENT CORRECTIVE ACTION(S): DO NOT** resume the work or activity **UNTIL AFTER** corrective action(s) is fully implemented.

E. HAZARD REPORTING Unsafe or hazardous conditions which, in the judgment of a Volunteer, present a risk of injury to Volunteers, railroad personnel, or the general public should be promptly reported to a Site Leader, Safety Team member, or the Operator.

F. NO SMOKING. Volunteer smoking of any substance or use of E-Cigarettes (aka "vaping") is prohibited on all trains, and in or on all Railroad property, including but not limited to structures, yards and rights-of-way.

G. DRUGS & ALCOHOL. The Friends has a **ZERO TOLERANCE** policy regarding alcohol and drugs. Use of, or being under the influence of alcohol, illicit drugs, or other illicit substances on Railroad property is strictly prohibited, and may result in immediate removal from Railroad property and dismissal from the Work Session.

H. PRESCRIPTION & OTHER MEDICATIONS are permitted if its use does not impair the safe work performance of the volunteer or the volunteer's co-workers. If you are taking medications that may cause impairment – **DO NOT OPERATE POWER EQUIPMENT.** Each Volunteer is primarily responsible for understanding their reaction to, and tolerance of medications, and for limiting or ending work activities that could be adversely affected.

I. COURTESY. Being a Friends Volunteer demands intelligent and courteous performance of all the tasks and responsibilities. The public judges the Railroad by the appearance and conduct of those who work on it, and we, as Friends Volunteers, are part of the Railroad family. Courteous, considerate treatment of the public, volunteers and Railroad employees is important.

A COURTEOUS WORKPLACE IS A SAFER WORKPLACE

J. PUBLIC RELATIONS. Volunteers should expect to see visitors from the general public in the yards, stations, or along the right-of-way and must assume that these visitors may be unfamiliar with Railroad operation procedures and signals. Volunteers must treat these visitors with extra care, and assume they may be preoccupied and unaware of ongoing train movements or Volunteer work. Volunteers should courteously warn visitors of any present or potential danger.

K. PUBLIC INFORMATION. Information concerning accidents or injuries is to be given only to a Team Leader, Site Leader, Safety Officer, or an authorized Railroad representative, and only when the information is known to be authentic and accurate. An exception is information given to medical and emergency personnel when needed to aid the injured or for safety.

L. FRIENDS' VOLUNTEER REQUIREMENTS. Complete information on becoming a Volunteer, including membership, medical insurance, liability waiver, minor child volunteers, etc. may be found on the Friends website at: <https://www.friendsofcumbrestoltec.org/> ">Volunteer>Volunteer Registration" Form R-1 Volunteer Instructions a must read for all volunteers. Additional Information may also be obtained by calling the Friends office, 505-880-1311.

M. CONSENT TO SUPERVISION. All Volunteers must, and are deemed to, consent to total supervision, direction, and control by agents of the Operator, and all Volunteers must vacate Railroad property under any condition if requested to do so by an agent of the Operator. However, it is understood and agreed by the Volunteer that the Operator is not required to provide such supervision, direction, or control.

N. PHYSICAL REQUIREMENTS. There are no specific physical requirements for Volunteer work, and Volunteers with physical limitations are welcome. However, some projects involve tasks that are physically demanding. If you have any doubt, you can safely perform a task, ask for advice or assistance from your Team Leader or the Safety Officer. Each Volunteer is responsible for knowing their limits and working within them.

O. WORK ATTITUDE. Volunteers who disobey safety rules or are careless regarding the safety of themselves or others, indifferent to the task(s) being undertaken, discourteous, dishonest, or otherwise behaving in a manner which would subject the Friends, the Operator and/or the Commission to criticism or liability, may be subject to Friends and/or Operator disciplinary action, including dismissal from the property and/or the Work Session.

P. DUE CARE. Each volunteer is responsible for their own safety and to watch out for co-workers. All volunteers must use Due Care around the Railroad properties at all times. They must be alert and attentive at all times when performing their duties and plan their work to avoid injury. Specific 'DUE CARE' issues include, but are not limited to:

HIGH ALTITUDE & WEATHER. Keep in mind the effects of high altitude, dehydration, heat, cold, and sun exposure, and take precautions. Drink plenty of liquid. Use sunscreen. Mosquito repellent is recommended. Be prepared for quickly changing mountain weather. Volunteers, especially those working at remote locations, should have extra clothing (i.e., coats, raingear, etc.) for inclement weather. During extreme cold, fog or storm, Volunteers working on the right-of-way or at remote structures must work in pairs, keeping watch in both directions and protecting each other against movement of equipment on the tracks and other hazards. During

thunderstorms be alert to lightning and be prepared to quickly take shelter (under a tree is NOT shelter from lightning). Lightning can strike up to 15 miles from a thunderstorm.

HEALTH, ENVIRONMENTAL, FIRE AND ELECTRICAL SAFETY. Accidents and injuries arise not only from physical workplace components like tools, equipment, and falling objects, but also from disease, infection, Volunteer health problems, environmental conditions, and accidental fire.

HANTAVIRUS. As a precaution against Hantavirus – a potentially fatal disease, any proposed work area where mouse excrement exists should be thoroughly wet down before beginning work using an ordinary garden sprayer containing a 50-50 solution of household laundry bleach and water.

FIRST AID. Approved first aid kits, suitable for the number of employees on duty, must be available and conspicuously placed. Volunteers should familiarize themselves with the location of the closest first aid kit to their job site. Exact locations will be briefed by the Safety Officer at the beginning of each work session. Make sure a first aid kit is available close by when working at any site more than 500 yards from the location of the first aid kits. Questions regarding locations should be directed to the Safety Officer or site leader. Periodic inspection of first aid kits is required. If any of the inner packages of the first aid kit are missing, the contents of the kit must be replenished.

AUTOMATIC EXTERNAL DEFIBRILLATORS (AEDs), used as first aid for persons experiencing sudden cardiac arrest are located as follows: The Carpenter Shop, Kitchen Car and the Chama Station in the ticket area, the CRF in Antonito, and in the Antonito Station ticket area. AED instructions are contained in each unit. Follow the basic steps and/or listen to the unit's audio instructions. Unit operation will be briefed by the Safety Officer at the beginning of each work session. If cardiac arrest is suspected, 911 should be called immediately to obtain emergency medical care in conjunction with AED first aid.

FALLING OBJECTS. Working, walking, or standing under other volunteers or locations where any object may potentially fall is prohibited. If such work is necessary, proper protection, as directed by the team leader or safety officer, must be used.

LIFTING. Each Volunteer is responsible for determining their lifting limitations. Good lifting practice is essential to prevent personal injury, to avoid back injury follow these proper lifting procedures: (1) test the weight of a load before trying to lift it by moving only a corner or a part, (2) be sure you can carry the load where you want it to go before attempting to lift, (3) bend the knees in order to lift with the legs and not the back, (4) do not twist or turn the body once the lift has been made, (5) set the load down properly by bending the knees to let the legs do most of the work, and (6) always push, not pull, the object whenever possible as this places less stress on the back. When lifting, have secure footing, bend knees, and keep back straight. Keep the object close to the body, take firm hold, and slowly straighten legs. Make sure the pathway to be used is clear of obstructions, debris or other conditions which may cause loss of footing. When changing directions while carrying material, do not twist your back. Team work is essential for safety. When working in groups, make sure everyone knows the moves to be made. When using team lifts, one person should give directions and be sure that everyone knows what is to be done before starting the lift.

ELECTRICAL PANELS. In buildings and shop areas, the floor area in front of electrical control boxes or emergency disconnects must be kept clear of any obstruction. Do not place materials or tools on top of electrical or switch boxes.

METAL LADDERS OR SCAFFOLDS, may not be used while working on electrical equipment or circuits.

POWER LINES. Be aware of the location of power or other overhead lines in the proximity of your work. Cranes or other equipment should not be used within **20 FEET** of overhead lines.

Q. PERSONAL SAFETY CLOTHING AND EQUIPMENT. Volunteers should use only approved Personal Protective Equipment (PPE). Protective equipment must be used where working conditions require, and in accord with rules, instructions, or directions from your Team Leader, the Site Leader, or the Safety Officer. **PPE is a responsibility of the Friends member.** The Friends make available PPE for purchase at cost. Also, there is a limited supply of PPE for temporary usage by members for tours or other activities when necessary. For the individual's safety PPE equipment is to be used only for its intended purpose. Volunteers must not alter, or use altered personal protective equipment. Volunteers working on Railroad property should wear the following attire:

FOOTWEAR. Field and yard work require shoes or boots made of leather or other appropriate protective material, such as a work boot which cover the feet and support the ankle. Steel-toe or "safety" shoes are recommended for work involving heavy objects and may be required on teams where foot injury is a high risk. **Running, walking or other casual shoes such as slip-ons are unacceptable.** This requirement does not apply to docents or others engaged in light duty or administrative work. **OPEN TOED, CANVAS, LOUNGING AND JOGGING-TYPE SHOES, AND SHOES WITHOUT A DEFINED HEEL ARE NOT ALLOWED ON RAILROAD PROPERTY REGARDLESS OF DUTY.**

HARD HATS, meeting ANSI Z89.1-2009, Type I, Class E and G Standards, must be worn at all times by all Volunteers performing project work on Railroad property, unless specifically exempted by the Site Leader and Safety Officer. Do not attach any screw mountings to the hard hat. Hard hats are not required in administrative or non-hazardous work areas.

HARD HAT SUSPENSIONS AND SWEAT BANDS, must be checked frequently for broken straps, loose stitching, or other defects. Adjust the suspension so there is a minimum of one (1) inch between the top of the head and the hard hat crown. Materials must not be placed between the hard hat crown and the suspension.

TROUSERS, covering the leg to at least the boot top, are required for field and yard work. Shorts and cutoffs are not permitted. The Site Leader or Safety Officer can waive this requirement where work assignments do not require the extra leg protection of long pants.

GLOVES are necessary when working on projects or yard work. Handling old wood and rusted steel, etc. without gloves can cause serious injury. Volunteers should carry leather or other protective material work gloves at all times and use them as needed. Glove fit is important; a snug fit is recommended. **REMOVE GLOVES WHEN OPERATING POWER HAND TOOLS OR FIXED EQUIPMENT.**

EYE PROTECTION, meeting ANSI standards, preferably with anti-fog lenses, must be worn at all times when working on the Railroad or on any job that may cause eye injury. Safety rated prescription glasses must

have side shields to be considered sufficient protection. Volunteers using non-ANSI rated glasses or any glasses without side shields must use goggles over their glasses. Goggles are available in the tool car/room. Eye protective glasses and goggles must be kept clean, in good repair, and be replaced when damaged.

DARK LENS GLASSES are **not** allowed under insufficient light conditions, except when welding,

FACE SHIELDS must be worn in addition to safety glasses when operating a power grinding or cutting machine, and when working with solid, liquid, or gaseous hazardous materials. Face shields must be kept clean and replaced when damaged. ‘Hat band and window’ style face shields and clear replacement windows are available in the tool car/room.

DUST FACE MASKS should be worn whenever non-toxic, non-chemically reactive, air born particulates are present at the work site. Disposable dust masks are available at several locations in the yard. Discard the mask after use. **Do Not** reuse a dust mask.

RESPIRATORS must be worn when conditions require, i.e., potential exposure to volatile, toxic, and/or chemically reactive materials. Before wearing a respirator, a Volunteer must receive use and fitting instructions. Most importantly, the respirator’s filter canister must be matched to the toxic environment for maximum protection. Fitting instructions include demonstrations and practice in installing and adjusting the respirator, and determining if it fits properly. To assure proper protection, the wearer must verify a good face seal face each time he/she puts on the respirator. Men must be clean shaven for a good face seal. **DO NOT WEAR A RESPIRATOR THAT DOES NOT PROVIDE A GOOD FACE SEAL.**

EAR PROTECTION ANSI Standard disposable ear protection is available at multiple locations around the yard. Ear protection should be carried at all times, and used whenever you are around loud noise levels. Molded prescription, dual muffs or ear inserts are acceptable.

REFLECTIVE SAFETY VEST ANSI Class 2 Mesh Safety Vest (orange or lime) is required where the person doing work is subject to danger from equipment, vehicle or train movement, when visibility is critical. In addition, all team crew members working on the right-of-way are required to wear a reflective vest.

SPECIAL SAFETY EQUIPMENT In response to unusual conditions or tasks, Team Leaders, the Site Leader, or the Safety Officer may require Volunteers to use special safety and/or protective equipment. Friends provided special safety and protective equipment will generally be available for Volunteer use.

II. FRIENDS WORK SAFETY RULES

★★★ SAFETY FIRST ★★★

IF IT CAN'T BE DONE SAFELY, DON'T DO IT!

DOCENT SAFETY. As a Friend's member they are involved most directly with the Railroad. Their job as a Docent riding the railroad puts them in a unique situation, as even though not an employee of the railroad they are directly responsible to the Conductor on the train and need to abide by the C&TSRR Operating & Safety Rules. Docents shall be well versed in the following sections: Operating Rules; Safety Rules as it applies to personal protective equipment; Fire Protection; First Aid. When involved with rail yard functions such as Yard Duty, Conducting Tours or just roaming the yard answering questions from the public they are functioning in a Friends recognized element and are expected to meet the standards as outlined in the Friends Safety Manual even though in that element they are not working on designated projects. Specifically, while in the rail yard docents shall wear personal protective equipment.

RAIL YARD SAFETY. Docents in performance of their duties as a Yard Docent shall be escorting tours or roaming in industrial areas of the rail yard. Compliance with safety standards while within the industrial areas of the yard is required. Those specific guidelines are defined in the Friends Safety Manual, Part 1, all sections. In addition to the Docent's safety, they have the responsibility to ensure that guests attending a conducted tour comply with the posted Public Safety Rules for the yard. If an attendee chooses not to comply you should request in a "courteous manner" that they not attend the tour. If the attendee insists otherwise contact the Dispatcher or a Railroad official.

WORK OUTSIDE OF A WORK SESSION: To enter the rail yard to do work on a project outside of a scheduled work session **you must be registered for session H** and adhere to the procedures outlined in **Project 0208**. Check-in and check-out with the shop supervisor in person. That is for your safety so that if something happens the railroad will know that you were working in a specific location. This procedure also applies to activities in support of the Railroad or Special activities in the rail yard. Remember any work performed requires a minimum of two people because of the environment and your safety.

ANTICIPATE DANGEROUS SITUATIONS. Do not place your hands, fingers, feet, legs, or any part of your body in a position where they may be caught, pinned, or crushed. Keep clear of heavy objects when they are being rolled or lifted by heavy equipment. Do not throw or drop material when it may cause injury. Avoid rubbing face, arms, or any body parts with hands or gloves while handling creosoted material.

REFUSE DISPOSAL. Discard garbage, bottles, ashes, and other refuse at designated locations. Accumulated debris can be an accident in waiting. Do not mix combustible materials with ashes.

FALL PROTECTION. Stay alert and be aware of your surroundings. Allow space when walking around overhead work.

WATCH YOUR STEP AT ALL TIMES. Rail yard activities, including simple walking, present an increased risk of tripping and falling. Work above ground level presents special risks. The Team Leaders, the Site Leader, and the Safety Officer will assess each job involving above ground level work and determine what special safety equipment and precautions are required, if any. For example, when working on the sides or tops of rolling stock, use the supplied safety appliances, e.g., ladders, scaffolding or body harness and safety line etc., when gaining

access to elevated locations above 6 feet. When working from a lift or working on an elevated structure a body harness and safety line are necessary above 6 foot in height.

ROOFS. Before walking or working on a roof, verify that the structure has sufficient strength to support the added weight. Be alert for weak areas. Volunteers must not work on roofs alone; a second person must be stationed on the ground. Working on roofs above 6 feet will require a body harness and safety line anchored on the opposite side of the building from the slope being worked on. Wear a shoe that will not slide on the roof surface.

LADDERS, SCAFFOLDS, AND PLATFORMS. Use only approved type ladders or scaffolds with rated platforms, consider load limits of the ladder with materials. When using a ladder make sure it is leaning at the proper angle.

INSPECTION. Before use, ladders, scaffolds, and platforms must be inspected for broken or missing steps, rungs, cleats, side rails, or other defects. Do not attempt to repair a damaged ladder; it must be destroyed. Wooden ladders must never be painted. Side rails must not be spliced. Makeshift ladders are not allowed. Do not use weak, cross-grained or otherwise unsuitable material for ladders, scaffolds, or platforms or ladder handrails.

SETTING LADDERS AND SCAFFOLDS. Follow the manufacturer's instructions, take precautions when on uneven ground to ensure the ladder or scaffold is level. Use adjusting legs for leveling scaffold.

LINEAR LADDERS AND SCAFFOLDS. Must be securely placed and able to support the intended load. Set ladders and scaffolds on firm, level footing and secured against movement. Portable ladders require safety feet. Scaffolds must be equipped with gripper cleats, non-slip safety shoes or appropriate outriggers. Do not lean ladders or scaffolds against unstable objects or place them on a box, barrel, or blocks for additional height. Place the ladder's base a distance from the wall equal to one fourth the ladder's length (the "1 in 4 Rule"). To prevent the possibility of ladder movement, safety restraints must be used. Note and adhere to the ladders' weight limits (color code). When necessary to exit the top of the ladder, the ladder side rails must extend three feet above the top landing, eaves, gutter, or roof.

STEP LADDERS, must be fully opened and the spreaders properly set. Step ladders more than 10 feet high must be held and steadied by another volunteer. Do not stand on step ladder parts labeled "NO STEP".

ERECT METAL SECTIONAL SCAFFOLDING, according to manufacturer's instructions.

CLIMBING LADDERS AND SCAFFOLDS. When ascending or descending always face ladders or scaffolding and use both hands. Only one person at a time may be on a ladder. Do not place clothing, tools, or other objects on ladder rungs, handholds, footboards, running boards, or steps. Never reach sideways from a ladder where your waist goes beyond the uprights. Do not climb ladders with tools or materials in your hands. Use a hand line.

PLATFORMS. When standing on a platform of any height you must be aware of its size to prevent stepping off. Do not reach from any platform.

PLATFORMS MORE THAN 6 FEET ABOVE GROUND. Each level must have guard rails **42 inches high** and toe boards at least **4 inches high** on all open sides and ends.

STAGING BOARDS, not securely fastened to supports, must extend at least 6 inches and no more than 18 inches beyond the last support. They must be equipped with end stops or retainer pins to keep them in place on supports.

LADDERS, must not be used in a horizontal position as platforms, runways or scaffolds.

PLATFORMS MADE FROM LOOSE BOARDS, not acceptable unless equipped with end stops to keep them from sliding or coming off.

LADDER, SCAFFOLD AND PLATFORM SAFETY PRECAUTIONS.

PROTECT THE PUBLIC AND OTHER VOLUNTEERS. Take precautions to keep people, especially the public, from passing beneath a ladder, platform or scaffold. Ladders used near a door, aisle, pathway, or roadway must be guarded by a Volunteer standing at the base.

WORKING OVER RAILROAD TRACKS, on a bridge, ladder, scaffold, or other elevated location requires care to keep ropes, wires, etc., clear of passing trains.

TOOLS AND MATERIALS. Do not place tools or materials on ladders, scaffolds, or platforms where they may fall or be knocked off.

DROPPING A TOOL, material, or other object from an elevated position without knowing if safe is prohibited. Use a hand line to safely lower it.

A TRESTLE OR "A" LADDER, is not to be used as a step or straight ladder. Do not stand on anything that makes your position insecure.

'WALKING' A LADDER, while on it is prohibited.

ENVIRONMENTAL SAFETY. In the event of a chemical, oil, or other hazardous material spill, it is the responsibility of the volunteer discovering the spill to immediately report to (i) their Team Leader or Site Leader and (ii) the Railroad Dispatcher landline 575-219-3304, report the spill location, spilled material (if known) and any other pertinent information.

HANDLING HAZARDOUS MATERIALS typically requires specialized equipment. In its simplest form it includes a full rated acid apron, acid rated elbow gloves, face shield and respirator with appropriate canister(s) for use on the mask. Stay away if the substance spilled is unknown or protective equipment is not available. Volunteers involved in handling hazardous materials must have a copy of the instructions and regulations for those handling materials.

A Safety Data Sheet (SDS) or Material Safety Data Sheet (MSDS), is a document that lists information related to occupational safety and health for the use and safe handling of various substances and products. SDS can be found in a notebook located in the CRF on the shelf outside the restroom or Chama in the Tool Car, Paint Car and the Carpenter Shop.

Do not clean any part of your body with gasoline, solvents, or with oily or dirty rags. Never use MEK (Methyl Ethyl Ketone) for any personal cleaning. Hand cleaners are available at wash sinks.

Hazardous Materials on the shelf or in storage at the Antonito CRF or in Chama facilities shall be labeled and placarded, where larger quantities are present, for the specific hazard. SDS or MSDS sheets for proper handling and emergency procedures shall be maintained at each of the *centralized* locations for immediate reference. Prior to the handling or use of hazardous materials the SDS or MSDS shall be reviewed.

FIRE PREVENTION is every Volunteer's responsibility. Extreme care must be taken to avoid accidentally setting fires. Volunteers must properly dispose of trash, oil or chemical soaked rags, or any materials that constitute a fire hazard. Notify your Team Leader, the Site Leader or the Safety Officer of any conditions that appear to be a fire hazard. Institute a precautionary fire watch during operations involving welding or grinding. Fire extinguishers must be taken to the operation site when a fire watch is established.

FIRE REPORTING. Any fire discovered on or near the Railroad right-of-way or any structure or rolling stock, regardless of cause, must be immediately reported to the Railroad Dispatcher in Chama, landline 575-219-3304 or by radio, whichever is fastest. Volunteers should attempt to extinguish a fire ONLY if they feel they can safely do so themselves with a fire extinguisher or equipment at hand.

FIRE EXTINGUISHERS. Volunteers should familiarize themselves with the operation of fire extinguishers in their immediate work area and know the closest fire extinguisher location. Direct any questions about fire extinguishers to your Team Leader or Safety Officer.

ACCESS TO FIRE PROTECTION DEVICES. Access to fire extinguishers, alarm boxes and other fire protection devices must be kept clear. Vehicles must not be parked, or material placed or stored in a fire lane or where building access is blocked.

FLAMMABLE MATERIAL STORAGE. Flammable liquids and combustible solids must be stored in designated areas in approved and properly labeled containers. Do not use flammable liquids as a cleaning solvent. Putting gasoline, kerosene, or any flammable liquid or any material saturated with a flammable liquid into a refuse can is prohibited. Do not use steel wool or a steel brush around liquid fueled motors, tanks, or other places where explosive fumes may be present.

BE SAFE, WORK SMART - PROTECT YOURSELF AT ALL TIMES.

SMALL HAND AND POWER TOOL SAFETY. Always use the right tool for the job!

KNOW YOUR TOOLS. Learn the applications, limitations, and hazards, of any small tool you need to use. Do not use tools for purposes for which they were not designed. Do not tape or otherwise cover wooden

handles. When in doubt regarding the correct tool to use, or how to use it, request assistance from your Team Leader or the Safety Officer

TOOL INSPECTION. Small Power and hand tools must be inspected prior to use to ensure they are in safe condition. Check for misalignments, binding of moving parts, broken parts, loose mountings, a defective on-off switch or power cord, and other conditions that may impair the tool's safe operation. A guard or other safety appliance that is damaged should be properly repaired or replaced before the tool is operated.

If in doubt about the tool's condition ask your Team Leader or the Safety Officer. Unsafe or defective tools must be removed from service, tagged with a description of the needed repair, and returned and reported to the Tool Car attendant. Do not remove a repair tag or use the tool until repairs are completed. The tool will be discarded when not repairable.

USE TOOLS PROPERLY. If you are unfamiliar with a tool, ASK FOR HELP! Knowing the proper operation and safety precautions to be taken can prevent your injury.

POWER HAND TOOLS. Only authorized Volunteers may use power hand tools. Authorization requires instruction or demonstrating prior knowledge of proper tool operation and use.

PERSONAL PROTECTION, appropriate to the job, should be used. cf. II. Work Safety Rules, Personal Safety Clothing and Equipment.

LOOSE CLOTHING, HAIR OR JEWELRY. When working around machinery or power tools wear a protective hair covering to contain long hair. Do not wear loose clothing or jewelry that can be caught in moving parts

REMOVE ADJUSTING KEYS AND WRENCHES. Always check to see that adjusting keys and wrenches have been removed from a tool before turning it on. Always disconnect the power before adjusting any tool.

SECURE WORK. Use a clamp, vise, or support stand to hold and stabilize your work. This is safer than holding the work with your hand. It frees both hands to operate the tool, and prevents the work from being torn from your grip, which can cause serious injury. Never hold an object when drilling on the drill press. If you need help securing a work piece, ask your Team Leader or the Safety Officer.

DO NOT FORCE TOOLS. A tool will do a better, safer, job when working in the manner and at the rate for which it was designed.

STAY ALERT. Watch what you are doing and use common sense. Do not operate a tool when you are tired. Do not rush.

KEEP WORK AREAS CLEAN. Cluttered work areas invite accidents.

MAINTAIN TOOLS. Keep tools sharp and clean at all times.

PROPERLY STORE IDLE TOOLS. When not in use, tools must be stored in their proper location, e.g., Tool Car or Room, Wood Shop, etc. in a dry place-out of the reach of children and the public.

III. RAILROAD OPERATION SAFETY RULES

★★★ SAFETY FIRST ★★★

**EXPECT THE MOVEMENT OF TRAINS, LOCOMOTIVES, CARS, OR TRACK EQUIPMENT
AT ANY TIME, IN EITHER DIRECTION.**

RAILROAD TRACK SAFETY

CROSSING TRACKS.

KNOW IT IS SAFE - LOOK BOTH WAYS

Before driving equipment or walking across tracks directly, or walking out of doorways, around corners, or from behind obstructions leading across tracks look in both directions. Do not walk between the rails unless required by your work. Do not cross the track in front of approaching equipment unless you can do so safely. When crossing tracks close to standing rolling stock, allow at least **20 feet clearance** and be prepared for unexpected movement.

WORKING AROUND RAILROAD TRACKS can be Dangerous!

WALKING, STEPPING, STANDING OR SITTING, on rails or any part of the track structure is prohibited, except when required by Project work. Be alert for conditions which may lead to loss of footing. Do not stand between a stationary object (wall, railcar, etc.) and moving rolling stock or equipment. Identify and be alert to escape routes in case a derailment occurs.

TRACKSIDE DEBRIS. Keep watch for debris or tripping hazards along the tracks and in other public areas. Either remove hazardous debris or report it to a Team Leader, the Site Leader or the Safety Officer

POTENTIALLY DANGEROUS TRACKSIDE CONDITIONS. Notice is hereby given that at certain locations along the Railroad there are close clearances, cattle guards, open drains, cuts and similar conditions requiring alertness and caution while working near or passing such locations. Volunteers must inform themselves of the location of such obstructions and use due care to avoid injury.

TRAIN MOVEMENT SAFETY.

“RED ZONE” is the area between cars where a person can be injured by moving equipment when an active engine is coupled to the car(s). Generally, working between cars coupled to an active engine is solely the Operator’s responsibility and should be strictly avoided by Volunteers. However, in case of emergency, Volunteers should be aware of the procedure for safely entering the space between cars. Whether using a radio or hand signal a person calls to the engineer for "Red Zone" protection the engineer will make the locomotive safe by fully setting the independent (locomotive) brake and centering the reverse lever. The engineer will then acknowledge the call for “Red Zone” by responding with, ‘set and centered’ and the locomotive number or by whistle. This tells the person it is safe to enter the "Red Zone".

“BLUE FLAG” PROTECTION can save your life!

NO BLUE FLAG - NO WORK

A blue flag (or a blue light at night) is used to protect workers inspecting, testing, repairing, and/or servicing rolling stock. Because these tasks often require sitting, lying, or crossing under or between rolling stock, Volunteers are exposed to potential injury from moving equipment without blue flag protection. At a minimum, a blue flag or blue light must be displayed at each end of the rolling stock or string of the car being worked on. In some instances, the Railroad may require additional measures, e.g., padlocked switches, chaining rolling stock to the rail, derails, etc. Rolling stock must not be coupled to or moved while blue flag protection is in effect. Blue flag signals may be removed only by the person who placed them. The railroad shop supervisor is responsible for placing and removing all blue flags.

TEAM LEADERS SHALL NOTIFY THE SITE LEADER, AND/OR THE SAFETY OFFICER WHO ARE RESPONSIBLE FOR WORKING WITH THE OPERATOR AND ITS DESIGNATED EMPLOYEES TO MAKE SURE BLUE FLAG AND OTHER APPROPRIATE PROTECTION:

- (1) IS IN PLACE AT ALL TIMES WHILE ANY ROLLING STOCK IS BEING WORKED ON BY VOLUNTEERS, AND;**
- (2) REMOVED WHEN WORK IS COMPLETED.**

EVERY VOLUNTEER IS TO VERIFY WITH HIS TEAM LEADER THAT BLUE FLAG PROTECTION IS IN PLACE BEFORE, AND AT ALL TIMES WHILE WORKING ON ANY ROLLING STOCK.

FOULING THE RIGHT-OF-WAY. Fouling the right-of-way, i.e., obstructing the track and/or impeding the movement of trains, is forbidden without the prior notification and approval of the Operator, and except as shown in the Daily Train Operating Schedule (Schedule) published by the Operator. **OTHERWISE, KEEP ALL TRACKS CLEAR AT ALL TIMES.**

The Team Leader is responsible for informing the designated Railroad employee or dispatcher daily of the location and/or milepost where, and the specific time(s) during which the track may be fouled.

The Team Leader must meet with Railroad Dispatch the day before, or earlier to schedule work on or near the track. **It is recommended Team Leaders schedule all work for an entire Session with Railroad Dispatch on the Sunday before the Session begins.**

The Team Leader must obtain a copy of the daily schedule the morning of each day work is planned and follow the time line of every day involved. The Team Leader must ensure the correct information is in the Schedule, and have copy of Schedule in their possession at the worksite.

RADIOS. The Operator may authorize Volunteer use (Site Leader, Tool Car, etc.) of Railroad frequency radios provided by the Operator for project support provided it does not interfere with normal Railroad radio traffic.

When working on or near the track radio communication with dispatch is required. Railroad communications take priority over Friends usage, unless the Friends communication concerns an emergency. Railroad Dispatch is responsible for the issuance and control of radios. In Antonito radio(s) are available with Dispatcher approval from the Shop Supervisor at the railroad shop.

RAILROAD SHOPS AND ENGINE HOUSES

ENGINE HOUSE AND SHOP ACCESS. Engine houses and shops are closed to casual visitors. If a Volunteer is authorized entry by an Operator employee for a valid Project related reason, (e.g., to borrow a tool or piece of equipment) a visitor's pass issued by the Operator may be required. During Work Sessions, a Volunteer's name tag serves as a visitor pass.

AUTHORIZATION FOR RAILROAD SHOP WORK. All Volunteers required to work in the Railroad shop and/or use shop machinery must be approved in advance for each Work Session by the Operator. When on duty in an engine house or shop, Volunteers must wear safety glasses, steel-toe shoes and a hard hat at all times, and ear protection when needed.

THANK YOU FOR READING THE SAFETY AND WORK RULES THAT GUIDE AND PROTECT ALL VOLUNTEERS.

SAFETY RULES ARE NEEDED FOR SOMETHING AS POWERFUL AND UNFORGIVING AS A RAILROAD. THEY HELP US ACHIEVE OUR COMMON GOAL - TO EXPERIENCE THE RARE AND FULFILLING OPPORTUNITY TO IMMERSE OURSELVES IN THE WORK OF AN HISTORIC, STEAM POWERED, NARROW GAUGE RAILROAD. IN SHORT, WE VOLUNTEER TO HAVE FUN, AND BEING SAFE AND HEALTHY IS A LOT MORE FUN THAN BEING INJURED IN AN ACCIDENT.

BE SAFE AND HAVE FUN!!

Note: The Friends of the Cumbres & Toltec Scenic Railroad Inc., an IRS 501(c)3 New Mexico corporation, works cooperatively with the Cumbres & Toltec Scenic Railroad Commission, the owners' representative, and the Commission's Cumbres Toltec Operating, LLC (Operator) to fulfill the Friends' mission of historic preservation, restoration and museum related activities. For further information see the Friends website: <https://www.friendsofcumbrestoltec.org/> > ABOUT > Friends History, or contact the Friends office at (505) 880-1311.

PART 2.

SAFETY & WORK RULES FOR

HEAVY EQUIPMENT AND

SPECIAL SKILLS NECESSARY FOR FRIENDS VOLUNTEERS.

General Safety Rules

UNATTENDED TOOLS AND EQUIPMENT. Tools and equipment of any type must never be left unattended while running.

1. **MAINTENANCE AND POWER DISCONNECT.** Any tool or machine must be disconnected from its power source, e.g., electrical outlet or pneumatic source, before cleaning, adjusting, maintaining, repairing, or changing accessories such as blades or dies on shear, punch, or forging machines. Standing or climbing on a powered machine or motor is prohibited. An exception is oiling or adjusting equipment required to be in continuous operation. In this case extraordinary caution must be exercised.

When machinery is awaiting or undergoing repairs, its circuit breaker must be in the "OFF" position. A tag must be attached with the date and name of the person who placed the tag. If the machine is not on a separate breaker, the tag must be attached to the disconnected power plug of the machinery.

2. **FUELING.** If refueling is necessary during use, the engine must be stopped and sufficient time allowed to cool before refueling. Always remove fuel containers to at least 20 feet from work area before starting engine.

3. **FLAMMABLE MATERIALS.** Never use grinders, torches or other power tools near flammable materials or where the arcing from within the power tool motor might ignite volatile fumes.

4. **SAFETY GUARDS.** Portable or permanently mounted power tools and equipment must not be operated without required safety guards. Operating grass, weed, or brush-cutting equipment without guard protection while any person is within (30-feet) the area in front or either side of the equipment is prohibited.

5. **POWER CORDS.** All power cords must be inspected prior to use. If so equipped, the ground prong must be used. Electrical power tools must not be picked up by nor lowered by the power cord. After use, all cords must be disconnected and properly stored to eliminate trip hazards.

6. **TOOL AND EQUIPMENT STORAGE.** When not in use tools, equipment, and materials, must be safely and neatly arranged in storage areas, tool bins, or designated locations, e.g., the Chama Tool Car or Antonito Tool Room.

Shop Machinery

1. **Authorized Personnel.** Only volunteers who are instructed or show knowledge in the operation and use of shop equipment will be permitted to operate equipment.
2. **Jewelry, Clothing & Gloves.** The wearing of finger rings, wrist watches, hanging jewelry, loose clothing or neckties while operating machinery is prohibited. If there is any possibility of a glove being caught by moving parts, rotating stock, etc., do not wear gloves while operating machines or tools.
3. **Removing Chips/Shavings.** Do not remove chips or shavings from a drill press or other machinery by hand. Use a brush, vacuum equipment, or special tools for that purpose.
4. **Floor Area/Aisles.** Floor area around shop machinery must be free from holes and irregularities. Aisle ways shall be designated by railings, paint, or other markings.
5. **Machine Guards.** All belts, shafts, gears, and other moving parts must be fully enclosed. Placing tools or materials inside of an enclosure formed by machine guard or switch box is prohibited.

Operating gas-powered grass or weed trimmers requires the use of a safety guard on the machine. Operator should not allow any person to be in front or to the side of the machine while the machine is in operation. As a minimum the operator must wear a face shield, hearing protection and gloves that maintain dexterity. It is strongly suggested the operator wear a long sleeve shirt.

Operating a brush or tree trimmer cutting device (saw or chain), that is designed to be operated **without guard protection**, while any person is within the area (30-feet) in front or either side of such equipment is prohibited. As a **minimum** the operator shall wear a hard hat with front screen protection, safety glasses, hearing protection, gloves that maintain dexterity and wear leg guards. Wear a heavy long sleeve shirt to protect the arms.

6. **Falling Tools.** If a tool or other object falls to the bed of a machine, no one must attempt to remove it until the machine is shut off and the circuit breaker locked out, if necessary.
7. **Safe to Turn On.** Before turning on the electricity, gas, steam, air, water or placing machinery in motion, the Volunteer must determine it is safe to do so.
8. **OPERATION OF MOTORIZED OFF-RAIL EQUIPMENT:** Volunteers may operate motorized off-rail equipment such as fork lifts, end loaders, or backhoes only with the consent of the site leader and after having been qualified to operate the specific equipment the volunteer and qualified trainer shall complete the qualification form and signed by both ensure the form is placed in the Qualified Operator Book located in the Chama Tool Car. To become qualified requires operator training and a demonstration of skills in the operation of such equipment. The Book provide reference to the volunteer being qualified to competently operate the equipment item indicated and is authorized to sign out specific equipment.

9. **BAND SAW.** Where possible, the length of the blade exposed must be no greater than the thickness of the stock being cut plus ½". Stock must be fed gradually and steadily. The blade must not be twisted or crowded. Do not walk away from operating equipment.

10. **CHAINSAWS.** Volunteers operating chainsaws must follow manufacturer's instructions. Operators must wear hard hat with face shields/guards, gloves, steel toe boots, heavy long sleeve shirt and leg guards. Hearing protection must also be used. Inspect the saw before use to ensure all handles and guards are in place and tight, that all controls function properly, and the muffler is operative. Make sure the cutting chain is sharp and properly adjusted and the bar is not worn or burnt, especially at the tip. Start the saw on the ground or other firm surface. Hold the saw with both hands during operation. Be alert for conditions which may adversely affect footing and safe operation of the saw. Shut off motor when moving from one work location to another. Carry the saw with the bar and chain facing to the rear and the muffler on the opposite side of the body. Do not use the saw to cut directly overhead. When on a slope, always cut downward. Do not use chain saw for cutting brush. Extreme care must be used to avoid contact between the nose of the saw and objects, an action which may cause the saw to kick upward.

Observe Fire Warnings for the area. Where the potential for fire exists clear the work area of dried brush and grass before attempting to cut. Two filled water backpacks must be immediately available along with fire line tools, designated for firefighting such as Shovels, McLeod Rakes, Pulaski Axes must be available when using a chain saw in the National Forest.

11. **Other Woodworking Machines.** Stand to one side and not directly behind the material being fed through any saw. Use a push block to feed narrow material through circular or hand saws. Do not reach over circular saws. Do not operate circular rip saw with the hood, spreaders, or kickback devices removed or rendered inoperative. Provide an adjustable stop to prevent the forward travel of the blade beyond the position necessary to complete the cut in repetitive operations. An effective device must be provided to return the radial saw automatically to the back of the table when it is released at any point of travel. The joiner must have a guard that automatically adjusts itself to cover the part of the cutting head not protected by the material being processed. The guard must provide protection for the entire length of the cutting space. The exposed part of the cutting head at the rear of the fence must be covered, and the knife must not project more than 1/8" beyond the cylindrical body of the cutting head. A pusher stick must be provided and used. Dead plates on planers must not be lowered while material is in the machine and the machine is running. Remove loose or scrap pieces of material from saw or table as soon as the cut is completed, using a suitable stick instead of hands to do so. Do not walk away from operating equipment.

12. **Lathe Use.** Leaving the wrench in the chuck of the boring mill or lathe is prohibited. Changing gears on a lathe while it is in motion, unless machine construction permits, is prohibited. File material on lathe with left hand to avoid contact with chuck or dog. Do not walk away from operating equipment.

13. **Planer.** Changing table stop to govern table travel while planer is in motion, is prohibited. Do not walk away from operating equipment.

14. **Press Use.** Standing in front of power press when two or more metal blocks are being used to transmit force to the object under the press, is prohibited.

15. **Clamping Material.** Where required, material must be firmly clamped to the machine before work is performed.
16. **Set Screws.** Safety set screws must be used in all revolving spindles or shafts unless protected by a collar.
17. **Compressed Air/Gas.** Use of compressed air or any gas to blow dust or dirt from body or clothing is prohibited. An air nozzle must never be placed against any portion of the body. Compressed air must not be used for cleaning purposes in shop areas, unless the hose nozzle is of the type which will reduce pressure to 30 psi or less at the main opening when dead-ended or obstructed. Inhaling purposely any type of compressed gas not specifically designed for inhalation is prohibited.

Gas Welding, Cutting, and Arc Welding

1. **Qualification.** If a Project requires welding the Team Leader and Safety Officer must jointly give prior approval of the specific welding activity, its intended use, the materials to be utilized, the welding method, and must explicitly authorize to proceed any Volunteer proposed to do the welding. Before authorization can be given, any Volunteer that is not a qualified welder must be instructed in and/or demonstrate knowledge of the proper use of welding equipment and the joint to be made. All welding must comply with manufacturer's instructions.

The 5 Parameters of Welding (CLAMS acronym)

Producing a weld bead that's the right size, shape, and depth involves many variables. Arc welding students remember most of them by reciting the CLAMS acronym since each letter stands for a welding parameter.

The 5 Parameters of Welding

Here's the list of the 5 welding parameters:

- **C**urrent
- **L**ength of Arc
- **A**ngle
- **M**anipulation
- **S**peed

Current: Amperage generally dictates the size and penetration of a weld bead when you're moving your torch at the right speed. Welders refer to charts from welding machines and electrode manufacturers or a welding procedure specification (WPS) for their current settings or try welding on sample plates of the same thickness to see what works best.

Length of the Arc: How close to the work plates the welder holds the arc of a wire or welding electrode can affect the amount of current and heat going into the joint. Held close to the work plates, the current and heat in the weld remain high. Held farther away, the electrode produces less heat and more spatter. As a rule of thumb, in stick welding, arc length should match the diameter of the electrode metal. In other words, if you're using a 1/8-inch rod, hold it 1/8 inch from the joint surface. You can increase the arc length to reduce heat to the puddle or limit the deposition of weld metal.

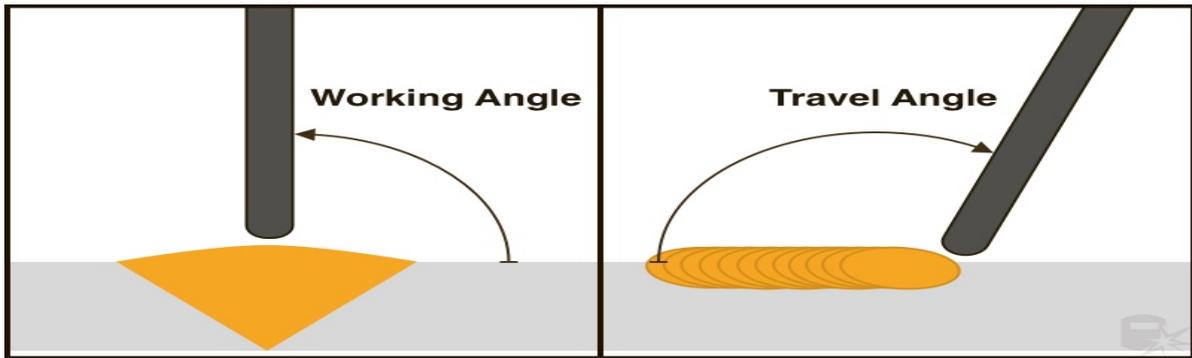
In a wire feed operation (i.e., MIG or flux-cored welding), the wire electrode is held farther away from the joint than in stick welding. That's because the arc is more concentrated and thus capable of burning through metal. For this

reason, students also learn the difference between electrode stick-out (the wire length from the contact tip) and contact-to-work-distance. Variations in the ESO or CTWD affect the current going into the joint, regardless of the wire speed setting on the machine.

Angle: There are two torch angles to remember when welding:

1. Work angle
2. Travel angle

Work Angle: The work angle, which is the relationship between the joint and the torch (or rod). Ideally, you'll hold your torch perpendicular, or 90 degrees, to the joint. The big exception to the rule is T-joints, where the work angle varies between 30 to 50 degrees.



Travel

Angle: The travel angle is the relationship between the torch and the line of travel. To see the joint and puddle, the welder may tip the rod up to 10 degrees in the direction of travel or sometimes against travel direction. As you can see in the first diagram, the angle of the torch to the workpiece (left) is 90 degrees, allowing maximum heat and current focused down into the open groove butt joint. (Think of this as the front view of the work plates.) In the diagram on the right, the travel angle shows a 5-10 degree tilt along the joint. This gives the welder a better view of what's going on in the puddle. When you drag your torch or electrode, the tilt is directed towards the puddle, which helps with penetration and achieving a thick bead. When you push, the tilt is away from the puddle, limiting penetration and heat going into the base metal.

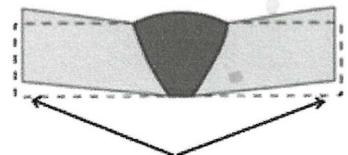
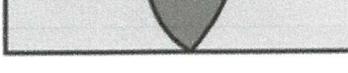
Manipulation: This refers to the movement of the welder's hand as they guide the electrode along the joint. Achieving tie-in at the toes is paramount, but it's also important to control penetration and heat. As described in the types of beads article, a weave, whip, drag or push motion are all examples of manipulation.

Speed: If you move too fast, the size of the weld will be small and achieve insufficient penetration. Move too slow, and you'll end up with a fat weld bead and likely too much heat going into your work plates. The following chart shows how some CLAMS variables impact a weld bead:

Weld Parameter Impact on Weld Bead

Good Weld	
Travel too fast	

Types of Welding Defects

<p>Porosity and Blowholes</p>  <p>Weld Cracks</p>  <p>Slag Inclusion</p>  <p>Distortion</p>  <p>Spatter</p>  <p>Excess Reinforcement</p> 	<p>Undercut</p>  <p>Incomplete Fusion</p>  <p>Overlap</p>  <p>Hot Tear</p>  <p>Incomplete Penetration</p>  <p>Burn Through</p> 
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In the last two examples, “WFS” stands for wire feed speed, which is how MIG and flux-cored welding machines regulate current. Notice that when the voltage is too high, the bead is wide and flat. Also, when the rate of voltage is too low, the weld bead sits on top of the base metal rather than penetrating into it. So, voltage determines the overall profile, or geometry, of the weld.

In stick welding, the welder sets the voltage directly but not the current, so the machines are called Constant Current (CC). In MIG/flux-cored, the machines provide Constant Voltage (CV), so the welder usually only sets the current. Some stick machines also have a setting known as Dig. This setting allows you to increase the current above the set output amperage if your arc starts to fizzle out.

Although the photos above don’t show it, too long of an arc can cause porosity (air bubbles) inside the weld, spatter on the base metal, and undercutting at the toes of the joint.

Other Variables to Consider: In addition to CLAMS, there are a few other variables to think about when planning a weld operation:

Joint Design and Fit-Up: How you prepare your work plates (or stationary structure) for welding may contribute more to the outcome of the operation than anything else. Your joints, beveled edges, ground root faces, and surfaces should fit together in a smooth and uniform manner before you start the weld. There shouldn’t be any burrs, gaps, or evenness. As a student, it’s easy to assume that once the metal heats up, everything falls together naturally, and all the little rough spots will disappear like magic. In fact, you can make things worse if you don’t take the time to do your fit-up correctly. Needless to say, the angle of your beveled sides should be appropriate for the thickness of the metal and the welding process being used. (In MIG welding, steeper angles are possible than in stick welding.) You should also tack your plates and use clamps as needed to prevent the joint from closing up in advance of the weld or other distortion caused by heat. Cleaning your weld edges in advance is also important. While some stick electrodes are designed to penetrate through rust and mill scale, those impurities can still cause problems. And while low-carbon steel is much easier to work with than other metals, you should still adopt the habit of cleaning or grinding the areas you plan to weld.

Size: The thickness of the base metal should factor into the decision about which diameter electrode, rod, wire, or torch tip you use to make the weld, as well as your voltage, wire speed, and/or current settings. There are plenty of other size factors to consider, but metal thickness usually comes first.

Heat Dispersal: Different metals disperse heat differently. The mass of your workpieces also has an effect, with tinier workpieces heating much faster than large, heavy pieces. Low-carbon steel can be very forgiving when

overheated, but other metals may lose tensile strength or other qualities if you don't monitor the heat going in and out of the plates or pipe. As you learn more about the chemical and mechanical properties of different metals and alloys, you may decide to include a pre- or post-heat treatment or your workpieces as part of the welding operation. Quenching plates after welding (to cool them down) is a practice that's generally frowned upon after the first semester of welding school. That's because the quench has a sort of traumatizing effect on the metal and can make it brittle.

2. **Protective Clothing.** Before gas welding, cutting, heating, or arc welding, volunteers must have suitable gloves, shoes, and clothing, and protective equipment must be worn. Clothing must be free of oil or grease and must not be made of highly flammable material. Shirt sleeves and pockets must be buttoned. Trousers or overalls must be without cuffs. Welders' aprons, capes, shoulder covers, jackets, spats or leggings made of leather or other flame-resistant material must be used as required when performing welding operations.

3. **Fire Extinguishers.** When using welding equipment, a fire extinguisher must be readily available.

4. **Inspection.** Inspect equipment before using. Use of electrical welding cables with damaged insulation or poor connections is prohibited. Only qualified personnel may repair leaks or worn places in hoses, which must be repaired by cutting out the defective section and remaking the joints or splicing with standard fittings. Do not use tape to repair a hose.

5. **Leaks.** When testing for leaks, use soapy water of a nonfat base or without petroleum products. Do not use an open flame. If a welding gas cylinder is leaking, remove the cylinder to an open area away from possible ignition sources, drain the cylinder, close the valve, tag the cylinder indicating the defect and return to the supplier for repair.

6. **Repairs.** Do not tamper with or attempt to make field repairs to torches, regulators or other welding apparatus. All defective equipment must be tagged and returned to the supplier for repairs or replacement. In general, welding, cutting or heating on any hooks is prohibited. Heating or welding steel on any hooks is prohibited. Heating or welding steel alloy chains and associated rings, links, and couplings is prohibited. If a Project appears to require welding hooks, chains, rings, links, or couplings follow the procedure of Item 1 for authorization to proceed.

7. **Taping Hoses.** When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than 4 inches out of every 12 inches shall be covered with tape.

8. **Eye Protection.** Refer to the following chart for correct eye protection while cutting or welding. Cracked filter glasses (lens shade) must be replaced immediately.

Welding

Operation.....	Shade No.
Shielded metal-arcwelding 1/16-3/32,1/8-5/32inelectrodes....	10
Gas-shielded arc welding (non-ferrous) 1/8-5/32in electrodes.	11
Gas-shielded arc welding (ferrous) 1/16-3/32, 1/8-5/32in Electrodes.....	12
Shielded metal-arc welding 3/16-7/32, 1/4in electrodes.....	12
5/16-2-3/8in electrodes.....	14

Carbon arc welding.....	14
Soldering.....	2
Torch brazing.....	3 or 4
Light cutting, up to 1 inch.....	3 or 4
Medium cutting 1 to 6 inches.....	4 or 5
Heavy cutting 6 inches and over.....	5 or 6
Gas welding (light) up to 1 inch.....	4 or 5
Gas welding (medium) 1/8 to 1/2in.....	5 or 6
Gas welding (heavy) ½ in and over.....	6 or 8

SAFETY GLASSES SHALL NOT BE USED IN PLACE OF WELDING OR CUTTING GOGGLES. All persons are prohibited from watching welding operations without proper protective goggles.

9. **Respirators & Ventilation.** Toxic gases, fumes, and dust, depending on the type of electrode used and the base metal or coating being welded on or cut, may necessitate the use of a respirator. Obtain the proper respirator filter cartridge from your Team Leader or the Safety Officer and an explanation of proper mask fit. Do not perform welding operations where oxygen is deficient, without proper self-contained breathing apparatus or continuous airflow hood. Adequate mechanical ventilation must be provided in confined spaces when welding, burning, freezing, or cutting materials that contain certain metals such as lead, brass, bronze, zinc, beryllium, cadmium, which have contained gasoline, oil, weld, cut, burn, or braze metal which has been cleaned with solvents until all surfaces, both inside and out, are clear of solvent and solvent vapor. Fans to enhance air movement may be necessary.

10. **Screens.** Where the safety of persons or property is endangered, proper screens must be used around welding and cutting operations. Volunteers must be cautioned not to look at or be exposed to indirect rays from the side while welding to prevent eye damage.

11. **Flammable Containers.** Welding, heating, cutting, or riveting must not be performed on tanks, tank cars, barrels, pipes, or any similar receptacles which has contained gasoline, oil, or other flammable or explosive material, until they have been thoroughly purged. Before using a cutting torch, be certain there is no person or combustible material on the other side which might be burned. Laying the object to be heated, cut, or welded across gas or air cylinder is prohibited.

12. **Storage.** Oxygen and acetylene cylinders must be securely stored with the valve end up and protected from being knocked over, damaged, or vandalized. The storage area must be well ventilated and away from exit paths. Oxygen cylinders must be separated from acetylene cylinders a minimum distance of 20 feet or by noncombustible barrier at least 5 feet high, having a fire resistance of at least ½ hour. (Note: This does not apply to cylinders in use or ready for immediate use.) Empty and full cylinders must be stored separately, with empty cylinders being plainly identified as such to avoid confusion. All oxygen and acetylene cylinders when not in use or when empty, must have their valve tightly closed and protective caps in place. Oxygen must be stored at least 20 feet away from flammable material, especially oil, grease, paint, or any substance likely to cause or accelerate fire. Oxygen must never be stored, used in, or conveyed through a paint shop or any paint storehouse. Cylinders must not be stored near a source of heat, such as furnaces or boilers. If stored out of doors, they must be screened from the continuous rays of the sun in localities where extreme temperatures prevail.

13. **Oil and Grease.** Oxygen cylinders, cylinder valves, couplings, regulators, hoses, and apparatus must be kept free of oily or greasy substances.

14. **Handling/Transporting.** Cylinders must be securely chained or clamped with valve ends up when transported and during use in the field. Do not remove or change numbers or marks stamped on the cylinders. Cylinders may be rolled on their bottom edge but never dragged. Portable cylinder carriers may also be used. Do not lift compressed gas cylinders by electromagnet. Never lift a cylinder by its valve-protection cap. Where cylinders must be handled by crane or derrick, carry them in a cradle or suitable platform and take extreme care that they are not dropped or bumped. **DO NOT USE SLINGS. DO NOT DROP CYLINDERS OR LET THEM STRIKE EACH OTHER VIOLENTLY. DO NOT USE CYLINDERS FOR ROLLERS, SUPPORTS, OR ANY PURPOSE OTHER THAN TO CONTAIN GAS. WHEN IN DOUBT ABOUT THE PROPER HANDLING OF A COMPRESSED GAS CYLINDER OR ITS CONTENTS, CONSULT THE SUPPLIER OF THE GAS.**

When empty cylinders are to be returned to the vendor, mark them "EMPTY" or "MT" with chalk. Close the valves and replace the valve protection caps, if the cylinder is designed to accept a cap. Regulators must be removed and protective caps applied when transporting welding gas cylinders on a public highway. Cylinders must be shut off, hoses and regulators disconnected, and pressure depleted when not in use. Suitable tank wrenches will be used to open cylinder valves, never hammers or other wrenches. Any cylinder containing acetylene which has been lying on its side must be stood upright for at least one hour before using.

15. **Hose Use.** Hoses used in gas welding, cutting and heating must not be used for any other purpose. When not in use, the hose or welding cable must be coiled and placed in designated locations.

16. **Hose Fire.** If a fire develops in the hoses, immediately shut off fuel gas and oxygen completely and unscrew the pressure adjustment screw on both regulators. Then the hose, torch, and regulator must be inspected, cleaned, and repaired by an authorized person.

17. **Damage to Hose/Cable.** A hose or welding cable must not be placed over any part of the body when in use nor pulled across anything that could cut or otherwise damage them. Care must be taken not to run over a hose or a welding cable or drop anything on them that would cut or otherwise cause leakage. Be alert that slag does drop onto the hose as the hose can melt.

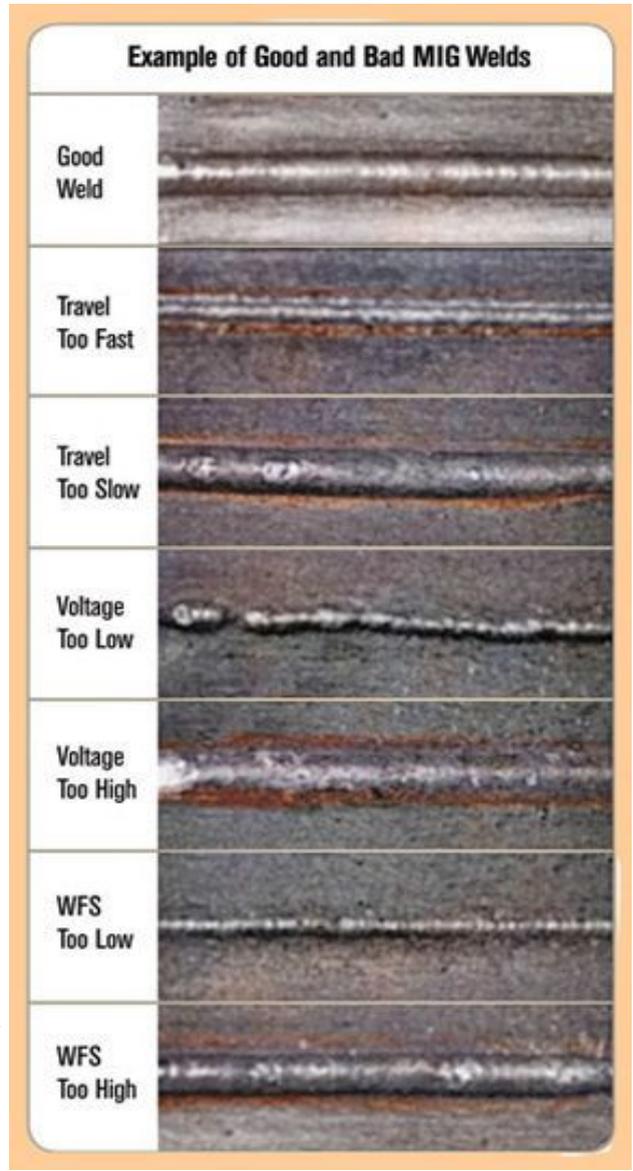
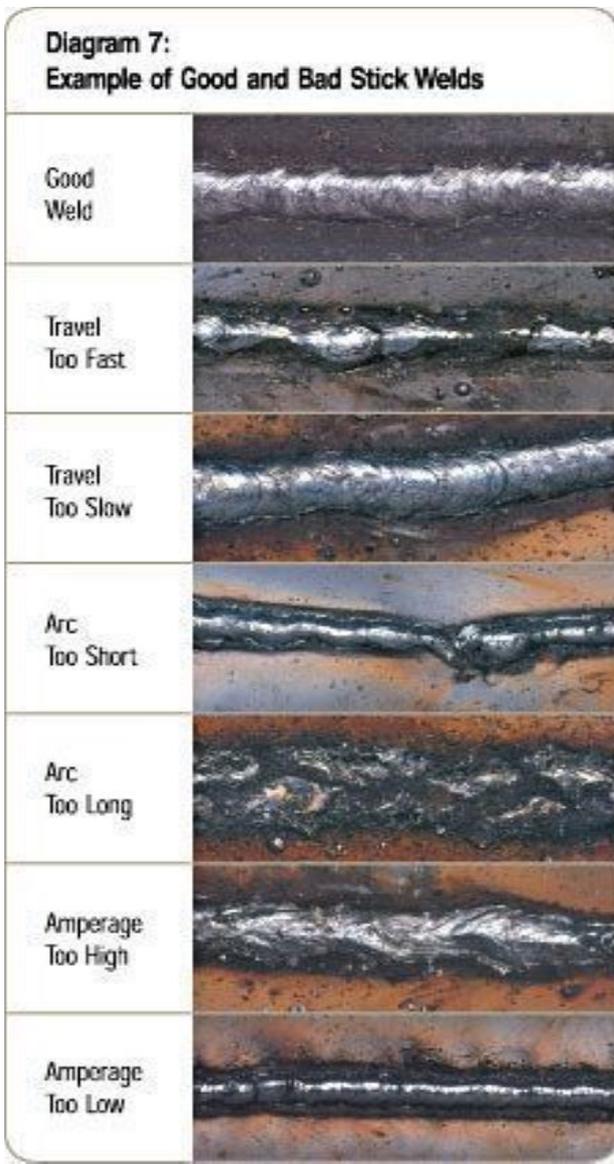
18. **Connecting Regulator.** Before connecting a regulator to a cylinder valve, the valve must be opened slightly and closed immediately to remove dust and dirt. Open the valve while standing to the side of the outlet, never in front of it. Never crack a fuel gas cylinder valve near another welding work or near sparks, lame or other possible sources of ignition. Pressure adjusting screws must be fully released before attaching regulators to cylinders. To open the cylinder valve without first releasing the pressure adjusting screw may damage the valve seat in the regulator or rupture the diaphragm. Therefore, it is imperative when mounting the regulator that the adjusting screw be so positioned as to point straight up. Apply the regulator to the cylinder making sure that all connections fit tightly. Never force or lubricate connections.

19. **Removing Regulator.** Before a regulator is removed, the cylinder valve must be closed, the gas released from the regulator, and the adjusting screw completely released.

20. **Valves.** Connect the proper hose to regulators. Stand to one side of the regulator gauge face when opening cylinder valves. Cylinder valves must be opened slowly. The oxygen cylinder valve must be wide open to seal the clearance around the stem and prevent leakage. Acetylene cylinder valves must not be opened more than $\frac{3}{4}$ to one full turn. Do not remove the valve key when the cylinder is in use so that, in case of emergency, the gas fuel can be quickly turned off. Two reverse flow check valves must be applied at the torch.

21. **Pressure Adjusting Screw.** Turn the pressure adjusting screw on the regulator to the right until the required pressure shows on the pressure gauge. Always be sure oxygen is turned into the oxygen hose before fuel gas is turned into the fuel gas hose.
22. **Protecting Regulators.** Protect regulators when not in use by first closing cylinder valves, draining hoses at the torch, then releasing pressure on the diaphragm. Red and green plastic protection covers must be in place over oxygen and acetylene regulator. Prevent a gas mixture from accumulating in the hoses when either is being relieved of pressure by closing the valve of the other hose. This will prevent flashback which could damage the torch, hose, or pressure regulator.
23. **Changing Cylinders.** Before changing or disconnecting oxygen, acetylene, or fuel gas cylinder for any purpose, drain both hoses at one time to remove any possible gas mixture.
24. **Oxy-Acetylene Torch.** Before lighting the torch, assemble the equipment and adjust pressures. The use of acetylene above 15 psi is prohibited. Volunteers using oxy-acetylene equipment must have immediately available the applicable chart which shows metal thickness, tip size, pressure setting of oxygen and acetylene, and the surface cubic feet per hour used. At no time should withdrawal rate of an individual acetylene cylinder exceed 1/7th of the cylinder contents per hour. To light the torch, open the acetylene or fuel gas valve and ignite the torch; then adjust the oxygen to the proper flame for the work to be performed. To shut off the torch, close the oxygen valve first and then the fuel valve. A lighted torch must not be laid down and must not be passed from one person to another or kept in your hand while climbing. Volunteers must not use the torch as a hammer. A cutting or welding torch must not be left in tanks, tank cars, fuel compartments or any similar work locations when not in use. Leaving oxy-acetylene torches on pressure lines unless valves at the other end of hoses are closed, is prohibited.
25. **Lookout.** Maintenance of Way welder helpers must keep a lookout and give ample warning to the welder, calling attention to approaching trains, engines, cars, or other equipment. A welder helper lookout must not leave the immediate vicinity of the welder or become involved in other affairs during welding operations. The lookout must not wear anything which hampers vision or hearing. Lookouts must wear a whistle and use it to give warning.
26. **Materials Under Stress.** Extreme care must be used when cutting rail or any other material under stress. Performing cutting, welding, or heating operation on containers unless properly vented to permit escape of gas or hot air is prohibited.
27. **Grounding.** Before starting electric welding, the ground cable must be firmly secured as close as possible to the work. The ground cable must not be connected to a water, steam, air, oil, gas, or other pipeline, or oxy-acetylene cylinders. When welding on engines, cars, cranes, etc. having trucks equipped with roller bearings, the ground cable must not be secured to the rail or truck parts or in a manner that would permit the current to flow through the roller bearings.
28. **Electrodes.** Electrodes must be removed from their stinger when not in use.
29. **Polarity Switch.** The setting of the polarity switch on a welding machine must not be changed while it is operating under welding current load, because of the danger of arcing and damage to the polarity switch.

- 30. **Cables.** Where practicable, a coiled welding cable must be spread out before use to avoid serious overheating and damage to insulation. Cables with repair splices within 10 feet of the holder must not be used.
- 31. **Wet Machines.** Electric welding machines which have become wet must be thoroughly dried and tested before using.
- 32. **Cleaning of Work Area.** Do not use your hands, whether gloved or not, to brush slag or metal from material being welded or cut. Always use a slag hammer or metal scrapping tool to remove slag from the cutting area.
- 33. **Welding Samples:** The charts below provide grading of the welding based on the bead appearance for both Stick Welds and MIG Welds



Abrasive Wheel Machinery

1. **Storage.** Suitable racks, bins, drawers, or boxes that will prevent breakage or moisture contamination shall be provided to store the various types of wheels used. All abrasive wheels are breakable and therefore care shall be exercised in handling and storage to prevent damage.
2. **Mounting.** Prior to mounting, all wheels shall be inspected by the user for damage and cracks. Wheels which show evidence of cracks, abusive handling, or abusive storage shall not be mounted. Before mounting, be sure the RPM speed on the wheel is greater than the RPM rating for the machine.
3. **Crack Detection Test.** The ring test depends on the damping characteristics of the wheel to alter sound emitted when the wheel is tapped slightly. It is subject to interpretation by the inspector and is primarily applicable to vitrified bonded wheels. To perform the ring test, wheels should be tapped gently with a light non-metallic implement, such as the handle of a screwdriver. With the wheel supported through the center hole with two non-sound conducting holders such as wooden dowels, tap wheels 45 degrees each side of the vertical center line and about 1 or 2 inches from the periphery. Then rotate the wheel 45 degrees and repeat the test. A sound and undamaged wheel will give a clear tone. If cracked, there will be a dead sound and not clear rings. If this occurs, discard the wheel.
4. **Safety Guards.** When equipped with safety guards that guard must be in place. Substituting or disabling any safety guard is prohibited. Guards shall be kept adjusted closely to the wheel with a maximum opening of ¼ inch to prevent large pieces of the wheel being thrown at the individual when grinding, should the wheel break.
5. **Blotters.** Blotters shall always be used between flanges and abrasive wheel surface to insure uniform distribution of flange pressure.
6. **Tool Rests.** Tool rests shall be kept adjusted closely to the wheel with a maximum opening of 1/8 inch to prevent the work from being jammed between the wheel and the rest. Grinding on the side of an emery wheel, unless designed for that purpose, is prohibited.

Jacking and Soil Excavation

1. **Jacking.** When necessary to jack rolling stock for removal or replacement of trucks, wheels, couplers or other heavy equipment or objects the jacks must be determined to have sufficient capacity. When on track approval must be obtained from the dispatcher. Jacks must be level and properly placed on the equipment jack pad or cribbing appropriate for the support point. After jacking the equipment must be blocked or supported on stands

to prevent movement. Cordon off a perimeter of 20 feet around the jacked equipment with posts and yellow caution tape.

2. Excavation Definition. A trench, pit or other excavation is defined as the digging or movement of 6-inches or more of soil.

3. Utility Field Survey. The Team Leader must verify to the Site Leader that a field inspection was conducted. Provide such information as to a map location, cross street and/or GPS coordinates. Verify that the proposed dig site has been marked. The county and state of record must be known. Include the size of excavation or trench in feet and the area it covers. Make reference to the utilities noted in the area both underground and overhead.

4. Request for Utility Locate. The Site Leader will then place a call to the appropriate state control center to request a utility locate. The utility locator requires a 4-day advance, not counting the day of call, to respond to the locate request. The universal locate phone number is 8-1-1 (if you use this number you must be within the state for which the request is being made) otherwise place a call to the 800 numbers below for the appropriate state the planned excavation is in. The Site Leader must provide an active e-mail address by which the locator can contact the Site Leader with information of the locate to acknowledge the request or ask for additional information. If no response is received by the 4-day window call back with the request number for follow-up, this number was given at the time of the original request was made.

Colorado 800-922-1987 web <http://colorado811.org>

New Mexico 800-409-2132 web <http://call811.com>

The locator will use colored flags or whiskers at the dig site to identify the type of underground utilities:

APWA Uniform Color Codes
(for temporary marking of underground utilities)

- RED – Electric Power Lines, Cables, Conduit and Lighting Cables
- YELLOW – Gas, Oil, Steam, Petroleum, or Gaseous Material
- ORANGE – Communication, Alarm or Signal Lines, Cables, or Conduit
- BLUE – Potable Water
- GREEN – Sewers and Drain Lines
- WHITE – Proposed Excavation Limits or Route
- PINK – Temporary Survey Markings, Unknown/Unidentified Facilities
- PURPLE – Reclaimed Water, Irrigation, and Slurry Lines

The underground markings will ONLY provide identification for the utilities within the area. It **WILL NOT** provide identification of owner installed equipment such as lighting, sprinkler piping or other underground installations.

For ground marking the law requires that the excavation be no closer than 18-inches of each side from the marked path, generally done with paint. Markings are good for a period of 30-days only.

5. Protection at Work Site. Any open trench, pit or excavation which has a drop-off **must have protection around the excavation** when not being worked. Use orange plastic fence with metal fence posts to surround by suitable guard, or assign a person to protect trench, pit or any other such opening, of which a cover has been removed or opened. Leaving open or unguarded after dark any excavation around trackage or other places where persons are likely to walk, is prohibited.

Keep a safe distance from edge of inspection, turntable, or other pits or trenches, except when necessary for the purpose of construction, inspection, maintenance, or use. Workers must vacate ditches or trenches that are located near tracks while trains are passing.

Before entering or permitting a volunteer to enter a turntable or other pit containing machinery, the team leader must personally see that power switch is in **“OFF” position and tagged “Danger-Do Not Operate”**. **When volunteers most work in ditches or trenches deeper than 4 feet, the Team Leader shall insure that the side walls are shored or tapered.**

6. Use of Heavy Equipment. The use of heavy equipment for the purpose of excavation requires special qualification. Skills must be demonstrated prior to use of equipment in the field and verified by a qualified and skilled operator. A two-person operation is necessary on all digs for safety. Entering a dig, pit or trench while equipment is still operating is prohibited. Refer to the OSHA Standard for details on excavation safety.

Articulating and Telescoping Boom Lift

Extendible and articulating boom platforms. Equipment utilized on rough terrain must be rated for that use. Base tractor is normally mounted on a 4-wheel drive wide axle platform with mud and snow tires. Power is typically a diesel engine; hydraulics is the lift system. All controls are mounted on the engine console and duplicate set is located in the basket platform.

Inspection. Prior to use a complete inspection of the equipment is necessary each day. Follow the operational instructions book located in the engine compartment to complete the inspection. It is important to check for hydraulic leaks that can give an indication of problems. In the engine compartment check all liquid levels for the engine and hydraulic system. Check all hydraulic flex line for damage or leaks.

Lift Controls shall be tested each day prior to use to determine that such controls are in safe working condition.

Operation. Only qualified persons shall operate an aerial lift. Contact the Site Leader or Safety Officer for qualification training. Belting off to an adjacent pole, structure, or equipment while working from an aerial lift shall not be permitted.

Volunteers shall always stand firmly on the floor of the basket, and shall not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position. A personal fall arrest or travel restraint system (safety harness and retention device) that meets the requirements in subpart I of OSHA standard 1910.67 this part shall be worn and attached to the boom or basket when working from an aerial lift.

Boom and basket load limits specified by the manufacturer shall not be exceeded.

The brakes shall be set and outriggers, when used, shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline.

An aerial lift truck may not be moved when the boom is elevated in a working position with men in the basket, except for equipment which is specifically designed for this type of operation.

Articulating boom and extensible boom platforms, primarily designed as personnel carriers, shall have both platform (upper) and lower controls. Upper controls shall be in or beside the platform within easy reach of the operator. Lower controls shall provide for overriding the upper controls. Controls shall be plainly marked as to their function. Lower-level controls shall not be operated unless permission has been obtained from the volunteer in the lift, except in case of emergency.

Climbers shall not be worn while performing work from an aerial lift.

The insulated portion of an aerial lift shall not be altered in any manner that might reduce its insulating value. Before moving an aerial lift for travel, the boom(s) shall be inspected to see that it is properly cradled and outriggers are in stowed position.

Electrical Safety. Operation in the vicinity of overhead power lines requires extreme caution. At no time shall operation closer than 20-feet be permitted.

Painting, Priming and Surface Preparation

Application: Most oil-based primers, paints and stains contain toxic chemicals that are suspended in the air during application. Those vapors can be inhaled leaving toxins in the lungs that can cause serious illness. During application of these coatings care should be taken to prevent the inhalation of vapors by wearing an air purifying respirator (APR) with P100 level cartridge/and filter combinations. Paint manufacturers also recommend use of APR's for water-based paints and primers. Paper filter masks do not provide adequate protection. Both the sprayer and hose tender must be equipped with APR's. In addition, safety glasses and/or a face shield must be worn to prevent back spray or splash back to the face. In some cases, Tyvek coveralls should be worn at the discretion of the Team Leader and Safety Officer. To protect the hands a heavy weight synthetic petroleum resistant or nitrile gloves will be used to retain dexterity and chemical protection. Based on the project additional safety equipment may be necessary, the Team Leader must assess the situation. Anytime thinners or acetone are used for cleaning or paint thinning, chemical resistant laminated film gloves should be used. All Personal Protective Equipment (PPE) will be provided by the Friends.

Surface Preparation: A major step in the painting process to ensure the longevity of paints and primers is surface preparation. Surfaces must be cleaned down to fresh wood or metal prior to priming and painting. Doing so requires wiping, scraping, chipping, sanding, and dust removal. In those processes, chips of paint, debris and a large amount of dust are generated, as well as a potential for wood splinters with dirt contaminants. Protection of workers involves utilization of a dust mask, safety glasses and protective nylon or leather gloves. It is strongly suggested that workers wear long sleeve shirts for arm protection. When removing lead-based paints, it is necessary to contain the chips and particulates being removed. Weather conditions are an important part of that containment. Utilize plastic tarps spread out under the work area to contain the particulates. People doing the chipping or scrapping must have on proper PPE to protect them. While

doing the chipping or scrapping and standing on the tarps they must have booties over their shoes to prevent tracking the material off the plastic tarps. At the end of the work period the booties are taken off and rolled up in the tarp. Each tarp is taken to a 55-gallon drum and each tarp is shaken off in the drum. A lid is placed on the drum and appropriately marked for hazardous material. The same plastic tarp procedure is used when Sponge Jet Blasting is required for lead paint. When necessary, the drum is shipped to a proper disposal site.

Sponge Jet Blasting

Sponge Jet System: The Sponge Jet blasting system, a substitute for sand blasting, is ideal for situations where minimal dust and minimal containment are required. As the name implies, miniature sponges impregnated with an abrasive medium are propelled at a surface. The surface material is loosened and then adheres to the sponge, pulling it from the substrate with minimal dust and low to medium ricochet.

Environmentally Safe: Sponge Jet provides a safe and reliable method of environmentally sensitive cleaning and preservation. It works across a range of blasting objectives from delicate cleaning to aggressive coating removal and profiling of industrial substrates, all in environments where suppression of fugitive emissions and rebound are required. Additionally, because it is so contained, this technique allows work in areas with public or commercial environments without interrupting other nearby functions.

Contaminates: The system can remove multiple layers of lead-based paint without causing additional damage, while staying within the safety regulations of EPA and OSHA. The lead containing waste material must be segregated, contained, and treated as a hazardous material. Sponge Jet has the advantage of keeping all of that lead contained, by cleaning the lead out of the sponge and then reusing the sponge. Sponge Jet blasting produces minimal dust and has minimal containment requirements.

The Sponge Jet system consist of:

1. A portable feed unit which houses and propels the Sponge Jet media abrasives to the surface. A centralized panel provides for adjustment of blast pressure and media feed rate allowing for precise control.
2. A flexible hose and pressure nozzle through which the sponge media is fed then propelled onto the targeted surface.
3. The abrasive sponge media available in 20 types which vary dependent upon the type of surface being blasted.
4. The Sponge Jet Recycler which classifies and cleans the sponge media for reuse. Up to 95% of the Sponge Jet media may be recycled for reuse.

Qualification of Operator: With the safety regulations involved (EPA & OSHA) there is a training requirement for all operators to be conducted by the manufacturer. Upon arrival of the equipment the manufactures representative will come to site to conduct the required training for the operator qualification certificate.

Mobile Crane Safety

Introduction: All operators of mobile cranes on Friends sites shall be licensed and competent to operate the type of cranes they will be using. Prior to commencement of any crane operation, a full comprehensive safety brief must be provided by the operations supervisor to all persons involved in the operation. It is extremely important that every person involved in the operation be present for the brief and give their undivided attention to that operational brief. All personnel involved must have a complete understanding of the requirements of the operation. All questions must be sufficiently answered prior to the operation. An outline to assist in the development of an operation safety plan will be provided to the crane operations supervisor to ensure a complete, consistent and comprehensive brief is given. The operations safety brief should be reviewed by the Site Leader and the Safety Officer prior to the brief being given to involved personnel.

All crane operators and or spotters will participate/be involved with a site risk assessment document for the tasks they and their machine/s are to do. He or she must fully understand the hazards and steps of the task being carried out. Proper PPE (hard hat, safety glasses, steel or composite safety boots, reflective vest and gloves) shall be worn during any operation. Particular hazards exist when operating mobile cranes. A safety zone must be set up. Use corner posts, warning tape, rope, signage to warn vehicles and/or public of the hazard. Operators, spotter's and personnel in the vicinity of the operating cranes must be alert to the potential for injury and/or damage at all times. These hazards include but not limited to:

- collision of the crane jib or its load, with personnel, equipment or buildings,
- contact with overhead power lines,
- overturning of the crane during lift,
- introduction of a source of ignition to a hazardous area,
- damage to underground services and drains.

Planning: It is important to involve all personnel who may be involved with the project to gain their input as to details having to do with the planned lift. Their understanding as to how the load will respond during the lift can be extremely important in understanding how to rig the load. The following are important aspects that must be considered:

1. **Proximity Hazards:** Consideration shall be given to the presence of proximity hazards. Hazards include, but are not limited to, the following:
 - Overhead power lines.
 - Nearby structures or other cranes.
 - Excavation the best location for lift.
 - Fixed hazards that cannot be moved.
 - Personnel *movement* within the crane working area.
 - Mobile equipment *movement* within the crane working area.
 - Public access areas including roadways, railways and rivers.
2. **Visibility:** The crane should be sited in such a way that the crane operator and spotter always have optimum visibility of the working area.
3. **Environmental Restrictions:** Precautions should be taken against the effects of

noise, exhaust gases, hydraulic fluids, lubricants, fuel, dust and other environmental pollutants emitted by the crane

- 4. Clearances:** Where two or more cranes work within a site, or share the same air space, procedures shall be established to maintain sufficient clearances to prevent contact between parts of the cranes and crane loads except where multiple cranes lifting operations are carried out. When cranes operate on adjacent sites and may share the same air space, negotiations shall be carried out to formulate procedures to ensure sufficient clearances are maintained between the cranes.

- 5. Flexible Steel Wire Rope (FSWR) Checks:** The criteria by which ropes are evaluated and discarded will vary considerably from job to job, and the proper extent and frequency of inspection will depend on possible risk to personnel and equipment, the rate of wear, fatigue, corrosion, rope stretch, reduction in rope diameter, etc. The type and distribution of wire failures or deterioration in a rope are generally a very good indication of their origin.

 - **Wear** - Wear occurs on internal wires and external wires. In both cases it is promoted by lack of lubrication, or incorrect lubrication, and also by the presence of dust and grit. Wear reduces the strength of ropes by reducing the cross-sectional area of the steel.
 - **Corrosion** - Corrosion breaks may occur on the outside of the rope and on the inside of the strands where it is a much more serious and unsafe condition, generally because of lack of lubrication of both wires and cores. In the presence of corrosion, abrasive wear is speeded up causing more rapid loss of section and strength.
 - **Kinks** - A kink is a deformation created by a loop in the rope, which has been tightened without allowing rotation about its axis. Imbalance of lay length occurs, which will cause excessive wear, and in severe cases the rope will be so much distorted that it will have only a small proportion of its strength remaining. Kinking is more commonly met in Lang's lay ropes, because of the greater amount of torque built up in them under load. Such ropes should always be kept under tension, and it is wise to release any built-up torque in them, under control, to make the ropes neutral in operation.
 - **Broken Wires** - Wire Ropes shall be replaced when the total number of broken wires measured over by a rope lay length exceeds 10% of the total number of wires in the rope length (A rope lay length is the distance for the lay of one strand as it travels 360° around the rope.)

- 6. Loading:** Crane operators and spotters must understand and check the weight or load charts applicable to the crane to be used. Weights should be marked on loads, contained on manifests or shown on drawings. If the load weight is not available, estimate the weight (using weight charts or tables) and include the weight of lifting beams, chains, slings, block and hook.

- 7. Crane Stability During Erection and Dismantling Procedures:** Precautions shall be taken when erecting and dismantling a crane to ensure that the stability of the crane is maintained. In particular, the following procedures shall be followed where applicable:

 - Only parts and components meeting the manufacturer's specification shall be used.

- Jointing pins shall be assembled so that they can be removed by a person standing on the outside of the assembly.
- All outrigger jacks shall be fitted with foot plates according to manufacturer's instructions. Be aware of ground condition, is it dry or wet, if wet will the outriggers sink in the mud when the lift is initiated. A larger foot plate may be necessary to help disperse the weight from the outrigger.
- All outrigger jacks shall be fitted and adjusted in accordance with the operating instructions. Are additional spacers needed to allow the outrigger to achieve a level plain.
- The correct amount of counterweight shall be fitted on the crane and at the appropriate location before the boom or jib is raised.
- When the operating length of boom or jib is reduced, the specified counterweight shall be removed to ensure that the backward stability of the crane is not adversely affected.
- Appropriate precautions shall be taken before a long boom is lowered to the ground level.
- To maintain the best margin of stability when a long boom is raised or lowered to the ground level, the hook blocks shall be lowered and rested on the ground before the Boom or jib is lowered.
- Where timbers are used under outrigger footplates, they shall be arranged so that successive layers are laid at 90 degrees to each other (pig-sty fashion) so that the top layer is in line with the outrigger arm.
- The crane must be leveled before attempting any lift. Adjustments to the outrigger blocking may be necessary in order to achieve a level platform.

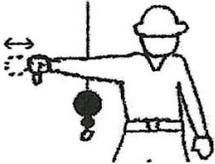
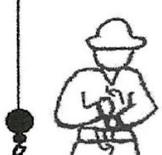
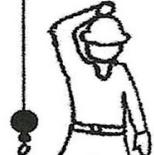
8. Crane Signals: If at any stage of the operation, the crane operator does not have a clear and unobstructed view of the load and its vicinity, or the point of attachment for a load, a competent person, trained in slinging or rigging, must be appointed as the dog person, and be positioned to observe the lift and load and to signal the operator should a rigging problem occur. The dog person must be in a position where he/she can easily be seen by the crane operator. To ensure that hand signals are noticed immediately the dog person shall wear **orange reflective gloves** so hand movements are more noticeable. Make sure to move as necessary to always remain in the view of the crane operator, you know he can see you. Do not take the responsibility of the dog person unless you know the hand signals. Only the appointed spotter shall give the necessary signals to the crane operator,

HAND SIGNALS FOR CRANE OPERATION

When there is a lot of traffic at a worksite, it is essential for workers to be able to use hand signals. Here are some standard hand signals for crane operation.

9. General Precautions: Observe the following precautions when operating a mobile crane:

HAND SIGNALS FOR CRANE OPERATION—continued

 <p>LOWER THE BOOM AND RAISE THE LOAD – With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.</p>	 <p>MOVE SLOWLY – A hand is placed in front of the hand that is giving the signal.</p>	 <p>USE AUXILIARY HOIST (whipline) – With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.</p>
 <p>CRAWLER CRANE TRAVEL, BOTH TRACKS – Rotate fists around each other in front of body; direction of rotation away from body indicates travel forward; rotation towards body indicates travel backward.</p>	 <p>USE MAIN HOIST – A hand taps on top of the head. Then regular signal is given to indicate desired action.</p>	 <p>CRAWLER CRANE TRAVEL, ONE TRACK – Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.</p>
 <p>TROLLEY TRAVEL – With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.</p>		

Source for hand signals: OSHA 29 CFR 1926, Subpart CC, Appendix A

<p>LOWER BOOM – With arm extended horizontally to the side, thumb points down with other fingers closed.</p>	<p>EXTEND TELESCOPING BOOM – With hands to the front at waist level, thumbs point outward with other fingers closed.</p>	<p>TRAVEL/LOWER TRAVEL – With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.</p>
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- Do not leave a crane unattended even for a short time, unless all loads have been removed,

lowered to the ground or the engine shut down and brakes applied.

- Do not operate a crane in high or gusty wind conditions that may put the load or personnel at risk. Always use the cranes load rating charts for guidance, these have wind and weather factors built into them.
- Do not use flat web slings to raise, lower or suspend a load.
- Do not use a fiber rope slings if a suitable steel wire rope can be used.
- Faulty slings shall be tagged for destruction with an Out of Service Tag and properly disposed of.
- Discard any wire rope used on a crane, when the visible number of broken wires in any length of rope diameter exceeds 5% of the total number of wires in the wire rope.
- Check that there are no loose objects on a load that could fall during lifting. Pay special attention to the tops of the containers.
- All lattice boom cranes fitted with outriggers will have the outriggers operational at all times. No slewing of these cranes is to take place unless outriggers are fully extended and in place.
- Do not use the crane to drag the load along the ground. Severe overloading may result.
- Do not exert a sideways pull on a shackle or eyebolt.
- Lower the load under crane power, except where a chain and block system are attached between the crane hook and the load.
- The work area, equivalent to that of the extended jib, should be barricaded off to ensure unauthorized personnel do not enter the area.
- A crane spotter shall walk alongside a load using taglines attached to the load, slung from a crane while the load is being transported from one area to another.
- A Load may be tied back to the crane to prevent the load from swaying, while the load is being transported.
- Use taglines to prevent loads from turning or swaying while the crane is in motion of lifting a load.
- Avoid sudden braking and fast hoisting, luffing and slewing.
- Do not under any circumstances, use a crane to lift a load over personnel, or allow anyone to ride the load.
- Keep personnel well clear of the suspended loads.

10. Operations Near Overhead Powerlines: This refers to hazards and risks presented by the set-up and operation of cranes in the vicinity of overhead conductors that are insulated or bare. Each State may have issued guidelines for the use of cranes and other plant in the vicinity of overhead conductors. Before operating a crane from the stowed condition, a check for the presence of overhead conductors and power lines shall be undertaken

All aerial conductors shall be treated as live unless evaluation from the local power company or transmission line operator, provides documentary evidence that the conductors have been positively de-energized, isolated and earthed. Where such documentary evidence has been made available, it shall state the date and time frame of isolation and any special conditions and precautions. The crane shall not be operated in contravention of this documentary information.

11. Precautions When Operating in Proximity of Live Power Lines: A crane shall only be operated within close proximity of live aerial conductors, if the separation distances appropriate to the 'NO-GO-ZONE' or 'SPOTTER-REQUIREDZONE', and risk controls identified are maintained. A site-specific risk assessment shall be completed before the commencement of the job by a trained and competent person. This assessment shall be verified immediately before work commences, and its relevance monitored during the job. If initial associated circumstances change, work shall cease until an appropriate risk assessment is undertaken.

Where a spotter is required to inform the operator in the event of the crane approaching the zone boundaries shown, the following applies:

- The spotting operation shall be carried out by a competent person. Required competency levels may be defined by the Office of the Chief Electrical Inspector or similar body in the applicable requirements of the State.
- The spotter shall be positioned so as to minimize the risk of exposure to hazards.
- The spotter shall be able to clearly observe the separation distances.
- The spotter shall not undertake any other work whilst performing spotting duties. The spotter shall be specifically instructed in the workplace hazards applicable to the site.

12. Separation Distances and Risk Controls: The zone separation distances should be not less than those identified. These separation distances shall include allowance for sag and sway of line(s) due to the effects of wind and temperature. Where the separation distances cannot be achieved, the applicable power company shall be notified in writing. The crane shall not be operated within the 'no go zone' until the applicable requirements below are satisfied. The separation distance between the crane and aerial conductors and risk controls when operating in the vicinity of aerial conductors shall comply with the following:

Overhead power lines (up to and including 133 kV) -The following applies:

- No go zone - The crane shall not be operated in the 'no go zone' as indicated for overhead power lines up to and including 133 kV, unless -
- Written permission from the electricity distributor has been obtained;
- All conditions specified by the electricity distributor are complied with;
- The electricity distributor is notified before commencing work;
- A spotter performs spotting duties; and
- A pre-start site/job meeting has been convened and a risk assessment completed.
- Spotter required zone - The crane shall not be operated in the spotter required zone for overhead power lines up to and including 133 kV, unless-
- Written permission from the electricity distributor has been obtained;
- A spotter performs spotting duties; and
- A pre-start site/job meeting has been convened and a risk assessment completed.

Overhead power lines (greater than 133 kV) the following applies:

- No go zone - The crane shall not be operated in the 'no go zone' as indicated for overhead power lines greater than 133 kV, unless -
- An easement entry permit has been provided by the electricity distributor;
- Written permission from the electricity distributor has been obtained;

- All conditions specified by the electricity distributor are complied with;
- The electricity distributor is notified before commencing work;
- A spotter performs spotting duties; and
- A pre-start site/job meeting has been convened and a risk assessment completed.

Spotter required zone- The crane shall not be operated in the 'spotter required zone' as indicated for overhead power lines greater than 133 kV, unless-

- Written permission from the electricity distributor has been obtained;
 - An easement entry permit has been provided by the electricity distributor;
 - A spotter performs spotting duties; and
 - A pre-start site/job meeting has been convened and a risk assessment completed.
- Down shop conductors- Before mobile machinery is set up for operation in the vicinity of down shop conductors, the power supply to the conductors shall be isolated prior to the operation unless appropriate control measures have been developed and implemented.

Appropriate warning signs shall be displayed on the barriers.

Pedestrians should be barricaded from the area of possible voltage step potential in the vicinity of the crane and associated equipment.

Person to crane contact - Only the crane operator shall be in contact with any part of the crane during operation. If the load needs to be steadied during lifting, a non-conducting 'tagline' shall be used. All persons involved in the crane operation in contact with the ground shall be provided with appropriate means of insulation from the ground.

NOTE: In some instances, more than one spotter may be required to handle taglines located to apply counter-reacting forces, to prevent the load swinging in the direction of tension of one of the taglines.

13. Overhead Powerline Contact: If the crane or load contacts aerial conductors, the relevant power company shall be immediately notified of the situation and, until assistance is received, a competent person shall remain in a prominent position to warn of the danger of electrocution. In such an event the crane operator should act as follows:

- Remain inside the cabin or on the crane.
- Warn all other personnel to keep away from the crane and not to touch any part of the crane, rope or load.
- Without anyone approaching the crane, operate the crane in such a manner to break contact, where possible.
- When unable to move or disentangle the crane from the aerial conductors, remain inside the cabin or on the crane and take no further action until it is confirmed that conditions are safe.

- When it is essential to leave the cabin or crane because of fire or some other reason then, to avoid being electrocuted, jump clear as far away from the crane as possible and avoid touching the crane and the ground at the same time. When moving away from the crane, shuffle or hop slowly across the affected area to avoid a simultaneous contact with areas of high potential difference.

Deric OP Start-up Procedure

Caution: Derrick OP was constructed in 1911 when safety requirements were minimal compared today; be aware and stay alert. All crew members need to wear PPE (hard hat, safety glasses, ear plugs and tight-fitting gloves, all must wear work boots, if ground crew slinging or rigging you must wear steel toe boots. Ground crew must wear a reflective vest for identification. Any loose-fitting clothing must be removed when assigned a cab position on the crew.

Hot surfaces - OP is steam powered and the piping and metal parts containing steam, as well as the steam supply hose is hot. Many areas may not be well insulated or protected.

Pinch points - There are many pinch points between moving pieces, gears, cables and pulleys

Wire rope - watch out for loose or broken wires in the cables

Sudden moves - the controls are not precise so sudden moves should be expected.

Falling items - stay out from under all parts of OP and any object being lifted - a sudden descent is possible.

Operating Limits:

Lifting capacity.....5000 Pounds

Boom elevation.....45 degrees

Side swing.....15 degrees (each side with outriggers in extended position)

Side swing..... 3 degrees (no outriggers, stay within track width)

Initial: An operating team consists of a minimum of six persons; one leader, two spotters/riggers, one throttle person, one winch operator, and one swing person. Additional people may be involved for training as long as they stay out of the way of those actually operating and the engine crew.

Team meeting: A pre-briefing is required for all team members and the engine crew prior to any operation. All crew members to include the engine crew must have a complete understand of the operational plan prior to the start of any operation. A big part of the pre-brief will be safety.

Signals: Review the standard crane operating hand signals. Each crew member must be familiar with the hand signals. Only one person, usually the dog person (Team Leader) should give signals; however, in case of urgency, any person may give the stop signal. If more than one person is giving signals, the operator should stop and request clarification.

Operating Plan: One activity at a time; do only “one” thing at a time. When that action is completed, move to the next activity. OP is not suitable for simultaneous activities. Be aware of your surroundings, if in the hoist house stay alert give operators space, don’t step on ropes or lean on things.

Operation: Power up, brake down; the boom and loads are raised by power and lowered by brake,

there is no power down option. To lower, it is necessary to first raise the boom or load a tiny bit to clear the ratchet pawl which retains the load, then lower the load slowly by releasing the brake gradually. To swing, release the swing rope from the bollard and place several wraps around the capstan on the side the boom is to move to. The opposite side must also be released from its bollard to provide slack; the throttle or winch operator can assist with this. DO NOT allow the boom to swing free.

Capacity 5000 pounds maximum (one NG truck set)

Pre-setup: Outrigger placement: There are two sets of outriggers, both should be deployed. The front set is the two oak and iron horizontal beams in front of the A-frame. Pull them out until they overlap a foot or two in front of the A-frame, do not pull them out any further. Set one of the heavy wood piers under the end of each beam. Use 2x planking under the pier feet if the ground is soft or uneven. Use 4x4 or 4x6 blocking to fill the space between the pier top and the outrigger beam then drive in 4x wedges so the end of the outrigger is raised and fully supported. Hang the second set of outriggers, 4 x 8 beams from the hangers on the A frame and attached the limit chain to the eye on the outrigger. Crib up as necessary with 4x4 or 4x6 blocking then drive in 4x wedges so the outrigger ends are raised and fully supported.

Wheels blocked and braked – Block the car wheels and set the brake. Install rail clamps on each rail.

Rigging complete - boom, load, swing – check.

Lubricate sheaves – most have zerk grease fittings at the ends of the shafts. Install the swing ropes and check for clear operation, no dragging or abrading, and correct routing. Stow excess rope out of the way.

Startup: Steam lubricator oil filled: There is a short piece of pipe off of the steam line, it has several valves. By closing the inner valve, removing the plug, and opening the outer valve, the piece of pipe can be filled with steam cylinder oil. Close the outer valve, replace the plug, and open the inner valve a small amount to admit oil into the steam line. There is no way to judge the amount of oil used; plan on repeating the process every hour.

Initial engine lube: The engine and winch have numerous lubrication points...**Caution:** Make sure the throttle is closed, steam is off, and brakes are set before lubricating the unit. Some of the lubrication points are obscure and others require reaching into the equipment.

Steam connected - tie down steam hose on engine pilot. Two K-36 engines have front end steam feeds, 315 and 168 steam come from the steam dome through schedule 80 pipe fittings and hose connection.

Steam main valve – opened or steam dome valve opened

Leaks - checked, fitting tightened (fix all leaks)

Warm up – vent and drains open, engine pet-cocks open. Open steam supply valve just a little, to allow steam to flow through the system. This will take some time, 10-15 minutes.

WARNING – SLUGS OF WATER WILL DAMAGE THE ENGINE: PREHEATING AND KEEPING COCKS AND DRAINS OPEN IS CRITICAL. KEEP SOME STEAM FLOW GOING ALL OF THE TIME TO KEEP THE PIPING FLUSHED OF WATER.

Roll engine – Warm up

Stop steam, brake and re-lubricate engine

Run engine most of the time to keep it hot and condensate free.

Raise boom – Remove blocking on idler flat

Check guys and stays – adjust if necessary

Test Operations: Raise and lower boom, Swing boom side to side, max 15 degrees each way. **CAUTION** - swing person has to pass in front of winch, watch lines and sudden movements.

Load line out – install snatch block

Test Lift – Wheel set, rig, lift, swing, set, repeat

Shutdown – Set boom on idler car; Slack in boom and load lines; Final lube; Shut off main steam; Leave vents and drains open; Remove rope and store in house; Remove outriggers and blocks; Install cabin doors.

Staffing – Suggest a minimum of six people. One Team Leader – located outside and visible to all; directs operations. Two spotters/riggers – one on each side of the intended work area. Attach/detach loads, make sure area is clear, keep observers back. Three operators in cab, one throttle person, one clutch/brake person, and one swing person. Observers, chroniclers, and trainees may be present to oversee operation must remain in an out of the way locations.

Occupational Safety and Health Administration (OSHA) Regulations

The OSHA laws and regulations passed by Congress and printed in the Federal Register in “Standards – 29 CFR” list many of the safety standards as referenced in this document; however, in much more detail than addressed by this publication. These standards are listed in two categories: 1) Industry and 2) Standards.

These are located on the U.S. Department of Labor web site:

<https://www.osha.gov/laws-regs/regulations/standardnumber/1926>

<https://www.osha.gov/>

The site is updated regularly by posting changes to standards and updating information.

Areas of interest are:

OSHA Sub-Sections of (Part 1910)

Construction (Part 1926)

In accomplishing our work on the Railroad, the Friends must comply with those parts of OSHA regulations that apply to the type of work undertaken. Team Leaders involved with construction or other complicated projects should review Part 1926 dealing with the specific issues of construction safety.

Safety Data Sheets (SDS) or Material Safety Data Sheets (MSDS)

A Safety Data Sheet (SDS) or a Material Safety Data Sheet (MSDS) is a document that list information relating to occupational safety and health for the use of various substances and products. SDS's are a widely used system for cataloging information on chemicals, chemical compounds, and chemical mixtures. SDS information may include instructions for the safe use and potential hazards associated with a particular material or product, along with spill-handling procedures. SDS formats can vary from source to source within a country depending on national requirements of both the end-users and the manufacturers.

A SDS for a substance is not primarily intended for use by the general consumer, focusing instead on the hazards of working with the material in an occupational setting. There is also a duty to properly label substances on the basis of physio-chemical, health or environmental risk. The same product (paints sold under identical brand names by the same company) can have different formulations in different countries. The formulation and hazard of a product using a generic name may vary between manufacturers in the same country.

The Occupational Safety and Health Administration (OSHA) requires that SDS's be readily available to all workers with regard to potentially harmful substances handled in the workplace under the Hazard Communication regulation. SDS's are also required to be made available to local fire departments and local and state emergency planning officials under Section 311 of the Emergency Planning and Community Right-to-Know Act. The American Chemical Society defines Chemical Abstracts Service Registry Numbers (CAS numbers) which provide a unique number for each chemical and are also used internationally in SDSs.

OSHA doesn't provide us with any SDS book requirements as far as the layout or organization of the books go. But OSHA's hazard communication standard is very specific about several things related to our SDS books.

The most important part of the regulation is that OSHA requires that our members have access to SDS documents throughout the work day. If a member has a situation, and a question arises as to the safe handling of any of the products that the member is working with, that member should be able to find the appropriate safety data sheet and see exactly what the manufacturer recommends to prevent adverse effects.

Our members are not required to remember all of the information included in all of the material safety data sheets for every product he or she may be working with. Therefore, our SDS books are reference books, and are accessible through the work day. Our SDS books are located in the Chama Carpenter Shop, Tool Car, and Paint Car. In Antonito, the SDS book is located in the CRF on the first aid kit shelf.

If working in multiple work locations through the work day (for example, in the Antonito CRF, then the Lava Pump House) then it is required that copies of the applicable SDS's travel with the member. As long as our members know where the applicable SDS's are, and the location is included in our written hazard communication policy, we will be in compliance with OSHAs hazard communication standard.

Members must also be trained on how to be able to find the SDS sheet(s) they need, and understand all of the sections of a safety data sheet.

Our SDS books must be kept up to date. If a member introduces a newly-purchased hazardous chemical or product, our SDS books must be updated to maintain an accurate inventory to include the recently purchased product. Additions and/or subtractions to the inventory will be needed as time goes by and we change products or add to the products that we normally use. Keeping an up-to-date list of what's received, or delivered, to our workplace(s) is the most thorough way to keep our SDS books updated.

Members must keep track of the products they buy using purchase orders, receipts, or invoices. We have a posted list with each SDS book which lists those newly received items so that we will be able to maintain an accurate chemical inventory list in our SDS books.

Any items in stock having a hazardous symbol on the container and not found in our SDS books should be added right away. If members are working with that product, the safety data sheet for it should be included in our SDS books as soon as possible.

The Safety Officer or Site Leader will check our SDS books regularly, keeping a list of what has changed, and archive any out-of-date SDS's that have been changed. Purchases of hazardous chemicals or materials that require the use of SDS's require the approval of the Team Leader(s) of the project(s) for which the chemical will be used. The purchase of the chemical should also be reviewed by the Safety Officer to determine proper storage requirements, and updates to the SDS Book(s).

Remember, always save old SDS or MSDS sheets. Litigation on long term health issues may require information only found on an old and out-dated sheet.

For the purpose of this safety manual, the terms "SDS" and "MSDS" are synonymous. Most of our members may still be searching for MSDS's, and for that reason we've continued to use the term. The Friends have all new MSDS books marked with "SDS" or safety data sheets. Our OSHA compliant hazard communications program must be kept compliant with OSHA's latest regulations.

Operation of Motorized Vehicles and Trailers

DRIVER REQUIREMENTS: Every vehicle driver must be fully conversant with and observe local, state and federal laws and regulations in the operation of vehicles. Drivers must have the required driver's or chauffeur's license on their person, medical certificate if required, and must see that necessary emergency equipment and tools are on the vehicle. Drivers must qualify for insurance coverage, Your name, license number, date of expiration is required to be placed on the Friends vehicle operators list, contact the Site Leader who will contact the Friends office with the information. Drivers must notify their Team Leader or Site Leader and discontinue operating vehicles at any time their license or permit has been suspended, revoked, or restricted.

AUTHORIZED PERSONS: Only authorized Friends members may operate Friends vehicles. Friends' members must pass an insurance background check and may not accept assignments unless they have been trained and are familiar with the vehicle or machinery to be operated. Unauthorized persons must not be carried in the vehicles.

IMPAIRMENT: Friends members must not drive when suffering fatigue, illness, lack of sleep or any other physical condition which may affect their alertness and ability to operate the vehicle safely.

SEAT BELTS: All vehicle occupants must use seat belts, where provided. This includes Friends vehicles, privately-owned vehicles used on Friends business, and leased or hired vehicles. Driver must not move a vehicle until assured all passengers are seated and have their seat belts fastened.

PASSENGERS: When riding in vehicles, all passengers must ride inside the passenger compartment, and be seated. A seat in a vehicle may not be occupied if there is no seat belt allocated to the person. Riding with arms or legs outside the vehicle, or riding in a standing position in the body, or on running boards or seated on fenders of the vehicle. Riding on material that is likely to shift, or riding where a shifting load is liable to cause injury is prohibited. The driver in charge of a highway truck must direct loading and unloading. He must see that all occupants are properly seated before the vehicle is moved. Sudden start, stops, or excessive speed over rough terrain must be avoided. Where the terrain is extremely rough, occupants must be cautioned to protect themselves. No person may ride in the body of a vehicle.

BACKING: Before backing vehicles where vision is impaired:

- A. Drivers must inspect areas to the rear of the vehicle and ensure no persons or objects are in the path; or
- B. A second individual, when necessary, must take position near the rear of the vehicle and act as a guide to protect the movement. If the driver loses sight of the guide, the move must be stopped immediately.
- C. When backing a trailer, the driver must use a spotter.

MOVING VEHICLES: Getting on or off moving vehicles is prohibited.

SPECIAL EQUIPMENT: Tractors, lifts, trenching or other specialized types of construction equipment will require Operator training. To be trained the Operator must be a licensed driver with a current State issued driver's license. An experienced Operator will act as trainer to provide an explanation of equipment and to address equipment safety. The trainer will provide supervised operation and practice for new operators. When the new operator operates the equipment successfully to the satisfaction of the trainer the new operator can be trained. The trainer must complete the training form and place in the Trained Operator Book located in the Chama Tool Car. Special equipment is not to be used on public roadways.

MAINTENANCE INSPECTIONS: Drivers must make daily inspection of oil and water levels, tires, test brakes, steering, and passenger doors. Any defect that impairs the operation of the vehicle must be corrected before it is used. Other accessories such as seat belts, wipers, horn, mirrors lights, dash gauges and instruments, speedometer, heater and fans, etc., shall be inspected by the driver when first assigned to vehicle, and at least once each week thereafter. Any defects in these accessories must be repaired as soon as possible. Vehicles must not be driven with the tailgates in such a position that obscure the view of the rear lights. Where required a DOT inspection must be performed and proper records maintained.

FUELING: When fueling the vehicle, the following must be observed:

- A. Turn off the engine. If fuel tank is near engine exhaust allow to cool before fueling.

- B. Do not smoke or talk on a cell phone when fueling and do not put fuel in tank near an open flame or any oil burning lantern.
- C. Keep nozzle of fuel hose in contact with fill pipe of tank during fueling. Do not fill portable fuel containers while in a vehicle, always set them on the ground.
- D. When necessary to carry a reserve gasoline supply, use only an authorized and properly constructed metal container (safety container), securely mounted.

TRAILERS: Pulling trailers requires a special attentiveness to anticipate turning radius, stopping distances and backing ability. Before towing trailers, drivers must inspect tires hitches, safety chains, lights, and equipment or material loaded on the trailer. Any unsafe condition noted must be corrected before towing is undertaken. If a trailer is equipped with brakes, the braking system must be operable. Trailers must be equipped with safety chains, unless they are fifth wheel or gooseneck type pivot locking device. Trailers must be equipped with required and operable stop, tail, directional, and clearance lights. Electrical connectors on trailers and vehicles must be compatible and must be connected before towing.

PARKING: When vehicles are parked, standard transmissions must be placed in low gear, automatic transmissions in park, and the motor stopped. If the vehicle is to be left unattended, the ignition key must be removed, the windows closed and doors locked. In addition to the above precautions, when vehicles or trailers are parked on a grade, other necessary precautions must be taken to ensure they cannot roll unexpectedly, such as wheel blocks, when necessary, to stop vehicle. Whenever possible, park off the traveled part of the roadway. A truck must not occupy any thoroughfare so as to obstruct traffic or constitute a hazard to other drivers. When parking along a highway, be sure the vehicle is visible for a safe distance from either direction. When vehicle is disabled and it is necessary to stop on the highway or shoulder, place warning signals to front and rear as required by law. When parking on a grade, the front wheels must be turned toward the curb or side of the road. If available, blocks should be placed in correct position against the wheels.

WORKING UNDER VEHICLES/TRAILERS: Sitting or lying underneath vehicles or trailers is prohibited, except when making inspection or repairs and then only when the brakes are set, wheels blocked, and the engine stopped and keys removed. Employees must not position themselves under any raised vehicle or trailer, unless proper support stands are in place. Employees must never position themselves under any raised vehicle or trailer which is supported only by a jack.

STARTING: Should a vehicle fail to start, consult the operator's manual or call for road service. Under no circumstances should gasoline be poured into the carburetor or intake system in an attempt to start the engine.

VENTILATION: Adequate ventilation of exhaust fumes must be provided when necessary to run the engine in a garage or building.

STORAGE OF TOOLS AND MATERIAL: Good housekeeping must be maintained in the passenger cab or driver compartment of vehicles at all times. Loose items must not be kept on the dash or rear window shelf. Tools, equipment, material and freight in truck beds must be properly secured. Hazardous materials such as gasoline, solvents, etc., must not be transported in occupied passenger compartments.

ACCIDENTS: Traffic accidents and vehicle damage, no matter how minor, must be reported to proper authority. In case of accident to persons or property in connection with any Friends vehicle or trailer, it is the duty of the driver to stop at once and be governed as follows:

- A. Assist injured person and call necessary medical aid as quickly as possible.
- B. Be courteous and do not argue or assume a hostile attitude. Do not admit responsibility and do not make any written statement to anyone other than a representative of the Friends.
- C. Give your name and address, owners name and address, and the license number of your vehicle to any authorized person requiring such information.
- D. Get the name, address, and driver's or chauffeur's license number of the other driver or drivers as well as the license plate numbers and description of any injured person and any witnesses.
- E. If city, county, or state police appear at the scene of an accident, secure their names and headquarters location.
- F. Where required by law, make report of accident to proper authority within the prescribed time limit.

JUMPING BATTERIES: When necessary to jump a battery, the following procedure must be followed:

- A. Turn off the ignition and all electrical accessories in both vehicles, including Company radio,
- B. Make sure vehicles are not touching.
- C. Shift both vehicles into neutral or park and set the emergency brakes.
- D. Check to be sure that both batteries are of the same voltage.
- E. Check to see that the fluid level is correct. If the fluid is frozen, do not attempt a jump.
- F. Attach the end of one jumper cable to the positive terminal of the discharged battery and the other end to the positive terminal of the booster battery.
- G. Attach one end of the second cable to the negative terminal of booster battery and the other end to a ground point on the engine compartment of the vehicle with the discharged battery. The ground point must be at least 12 inches from the battery being jumped.
- H. Engage the starter of the car with the discharged battery. If the engine does not start immediately, start the engine of the booster car to keep its battery from being drained.
- I. After the car with the discharged battery is running, remove the cable connection from the engine compartment. Remove the second cable by disconnecting at the booster end first.

OPERATING: Drive at reasonable and prudent speed, considering weather, traffic, road, vehicle and all other prevailing conditions. Legal speed limits must not be exceeded. In the railroad parking lot speed is 10 MPH. In the rail yard speed is 5 MPH. At dusk and after dark, reduce speed when approaching curves or crest of a hill and during unfavorable weather and road conditions. Reduce speed, proceed at restricted speed and use extreme caution when driving on snow or ice; or through sleet, fog, rain, mist, dust, smoke, etc. Under slippery conditions, care must be taken against the spinning of the wheels, with consequent danger of skidding. When conditions warrant, tire chains must be applied. When preparing to reduce speed and stop, signal your intentions well in advance.

Drivers must not pass school buses with warning lights flashing, headed in either direction, which have stopped to load or unload passengers, except on divided highways where local laws permit.

Watch out for children when approaching schools or playgrounds, or when children are seen playing in or adjacent to streets and highways.

Vehicles must be kept in gear and clutch engaged when going downhill.

When necessary to pass through water, the operator should lightly apply the brakes several times while passing through the water and again after leaving it. This will help to prevent foreign matter from collecting on the brake lining.

The driver must be familiar with the height, width and weight limit of the vehicle he is operating, its licensed weight limit, and the load being hauled. He must also be familiar with the clearance restrictions of the state, county and city in which he is operating the vehicle and know that the truck and load are within the clearance and loading restrictions. The driver must exercise care to avoid low bridges, wires, trees, etc. and must not cross any bridge on which the weight of the truck and load exceeds the load limit of the bridge.

A red flag during daylight, or red light after dark must be placed on any projecting load. Before crossing any railroad grade crossing, the driver must make sure it is safe to cross. Before entering a main road from secondary or side road, come to a stop and make sure it is safe before proceeding.

Where required, an approved fire extinguisher must be kept in vehicle. The driver must know that it is charged, in good working condition, and how to operate it.

The handling of explosives on vehicles is prohibited, except upon proper authority and in accordance with existing laws and regulations.

PERSONAL VEHICLES: Permission to operate or park a motorized vehicle on the Railroad premises may be given Friends members subject to the convenience of the Railroad and at owner's risk. The movement of such vehicles on Railroad premises must be at a safe and moderate speed at all times.

John Deere Gator Safety

Either the 2x2 or 2x4 John Deere "Gator" can be a great assistance in carrying tools or materials to a specific job site. We must also keep in mind that it can be a deadly piece of equipment if operated incorrectly.

OPERATOR SAFETY: Gators have the tendency to turn over very easily so when making a sharp turn slow down, if going over rough terrain slow down, if going down a hill slow down. **In a gator, speed can kill you!** On an incline never travel sideways the Gator can roll over, always go straight up or straight down the hill. Never attempt to turn on an incline all turns need to be made on level ground. The gator can run over you when getting out and not setting the parking brake. Never leave the engine running and get out of the Gator. Before operating make a walk-around inspection to ensure vehicle is in good condition. When operating the Gator, you must stay alert and keep both hands on the steering wheel as something can happen, in a split second it can change direction.

OPERATING RULES: Only Friends members may operate the Gator. An operator must possess a valid "State" issued Driver's License for a motor vehicle in order to operate. Operators must be taught the operating control and procedures for operating a Gator. The John Deere Gator Manual provides the specific safety training needed by each operator. The Gator is to be operated off-road only and not on the highway, or public streets. No more than two people are allowed on the Gator at any time, only one driver and one passenger. There is no riding in the utility bed. Before crossing any Railroad track(s) you shall come to a full stop and look in both directions of

the track to determine the track is clear before crossing. Anytime the operator stops and gets out, the Gator shall be turned off and key removed with the parking brake set. If you are not qualified for the Gator you cannot operate it. NOTE: The speed limit in the railroad yard is 5 MPH (a fast walk). DO NOT SPEED! The parking lot is posted at 10 MPH.

QUALIFICATION: Only a trained operator can provide training and a safety briefing for a new operator. The John Deere Gator Safety Training Agreement will be used as a guide for this training. After the new operator has successfully completed the training, the first couple of trips the trainer shall accompany the new operator and determine if the new operator is sufficiently trained to operate the Gator. When trained the new operator and the newly trained operator shall sign and date the John Deere Gator Training Agreement and the previously trained operator shall verify the newly trained operator has a current, State issued, driver license for a motor vehicle. The training agreement shall then be filed in the Trained Operator Book located in the Chama Tool Car.

EDITOR NOTE: At the time of publication the information contained within this manual is believed to be correct. The reader needs to understand that safety procedures continue to evolve, as a result field safety procedure will change. For the most current information refer to the Friends web site Form R-8 Safety Manual. Updates are posted to the web when necessary, refer to the date in the upper left corner of the R-8 document. The use of the pronoun “he” indicates both “he” and “she”.

Notes

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