PLAINTIFF'S EXHIBIT
ETCO-226

The SAFE WORKER at Ethyl

ETHYL
ANTIKNOCK COMPOUND
ETHYL CORPORATION

ETHYL CORPORATION
PACIFIC COAST PLANT

ETC 37200

The SAFE WORKER *at Ethyl*

ETHYL CORPORATION

PACIFIC COAST PLANT

ETC 37201


SAFETY
RULES

FOREWORD

SAFETY IS AN IMPORTANT PART of every employee's job. With your full cooperation and willingness to do your part to prevent accidents, we firmly believe that this Plant can be operated without injuries.

Ethyl Corporation has constructed a safe Plant here. We supply many types of safety devices and equipment for your protection. We endeavor to teach you how to work safely. We do all this because of our sincere interest in your health and welfare and the happiness of you and your family.

Your part in the Plant safety program includes such as reporting hazards that come to your attention, using safety devices when needed, keeping your mind on the job you are doing, keeping your work area clean and orderly, and knowing and following the safety at all times.

This booklet has been prepared as a guide in general safety pertaining to the Plant as a whole. The rules listed on the following pages are to be used in conjunction with the specific safety rules issued for each area and each specific job. This booklet is your friend. Do as it says and you truly will be a safety-minded individual who is protecting both his own welfare and that of all other Plant employees.

James M. Gill

Plant Manager

ETC 37203

TABLE OF CONTENTS

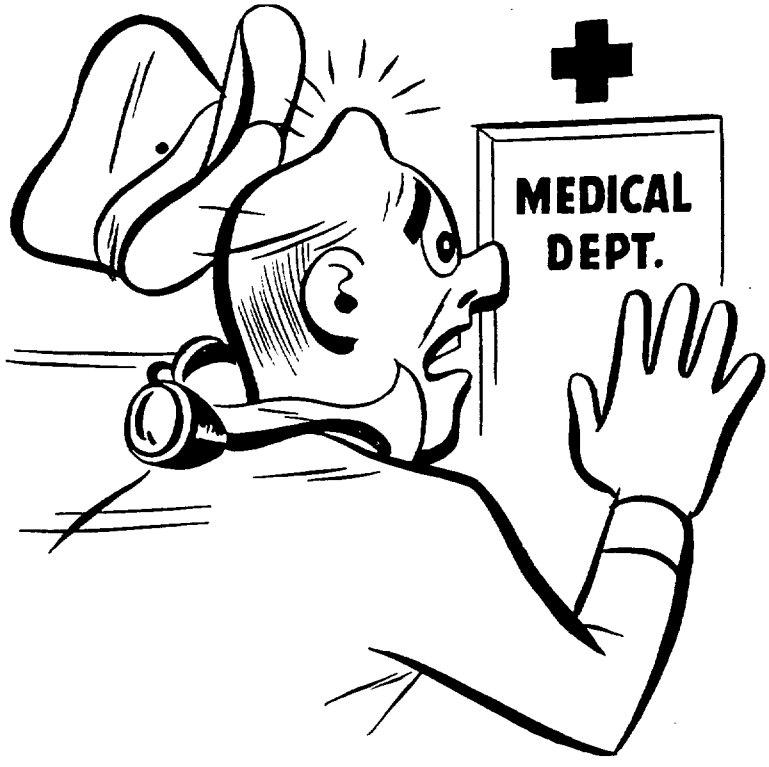
Four Guides to Safety

The Following Rules are Considered *Most Important* and Must be Followed:

1. If you don't know—ask your immediate supervisor.
2. Report to the person in charge of the area before starting work, unless making relief on your regular job.
3. Report all injuries to your immediate supervisor, if possible, then go immediately to Plant Medical for treatment.
4. Be alert for unusual noises or sounds. Early detection and correction could prevent an injury to personnel or damage to equipment.

Safety Today — Tomorrow May Be Too Late

ETC 37207



SECTION 1

Health and Hygiene

HEALTH AND SAFETY go hand in hand. To protect your health, the Company maintains an efficient Medical staff and facilities, and insists on high standards of Plant hygiene.

Employees are expected to comply with the following health practices:

- Eat only in approved lunchrooms or areas so designated.
- Food must not be taken into restricted areas. You will be notified by your immediate supervisor which areas are restricted.
- Eat the proper food at regular times and get proper rest. You cannot work safely and efficiently without proper rest and nourishment.
- Drink water on the Plant only at drinking fountains. During hot weather, use salt tablets as directed.

- Hands and face should be washed and the mouth well rinsed before eating.
- Employees working in certain areas must bathe and change clothing as part of each day's work. Your immediate supervisor will advise you of such areas. Wear shower clogs as a means of controlling the disease known as "athlete's foot." Clogs will prevent spreading or increasing the infection when already present.
- Avoid the repeated use of gasoline, turpentine, solvents or strong soaps for washing hands or face. They remove natural oils from the skin and may cause irritation and inflammation. Use cleansers provided.

- Kerosene is available at designated locations to wash contaminated areas of the body should you come in contact with toxic or irritating chemicals. Do not get kerosene in the eyes or ears, and be sure it is thoroughly removed from all parts of the body by the use of plenty of soap and water.
- Wear proper clothing in good condition. Sleeves should be kept rolled down in sodium or acid areas or in locations where harmful material may contact the arms.
- Avoid exposure to gases, chemicals, fumes or vapors. Use the prescribed clothing and safety equipment.
- Do not put on clothes or shoes that have been contaminated with chemicals or solvents. Check with your immediate supervisor in all instances.
- Have your clothes laundered when necessary.
- Help keep the locker rooms, washrooms, lunchrooms, and toilet rooms clean and sanitary.
- Avoid promiscuous spitting. It is a filthy habit.
- Carrying intoxicants on the Plant, or being under the influence of intoxicants while on the Plant, can be cause for immediate dismissal.
- Horseplay will not be tolerated on this Plant. Wrestling, pushing, shoving and similar pranks commonly known as "horseplay" are prohibited.
- There should be no running on the Plant except in an emergency.
- Illness and worry are not conducive to personal safety. Plant Medical is at your service for consultation if you are worried because of ill health.

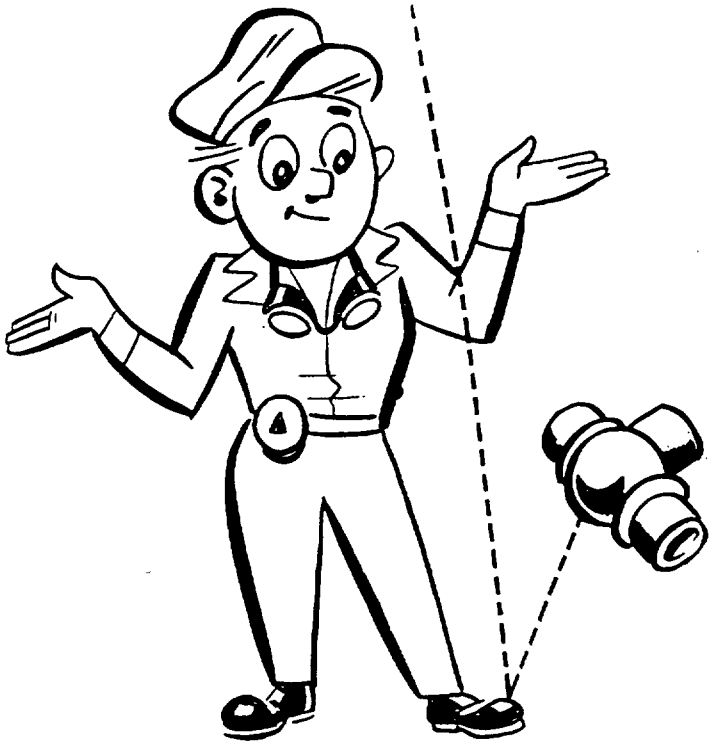
Prompt Treatment of Injuries

Prompt and proper treatment of any injury may prevent unnecessary suffering and loss of time. The service offered by Plant Medical is for your benefit and protection. Attendants are on duty at all times. Visits to Plant Medical will in no way be held against an employee. Learn and observe the following Plant rules:

- Every Plant injury, however slight, must be reported to your immediate supervisor, if possible, and to Medical immediately after it occurs.

IN CASE OF A SERIOUS INJURY:

- Immediately telephone Plant Medical. Be calm and clear in making your report and request for assistance.
- Avoid moving an injured person unless it is apparent he is in further danger, in which case move him as gently and as little as possible.
- Make the injured person as comfortable as possible and make sure there is no danger from exposure. Common sense must be your guide in assisting after a serious injury.
- If an object gets in the eye, go immediately to Medical and have the object removed. Serious eye injuries may result from delayed or improper removal. Do not rub the eye or permit a fellow employee to remove the foreign body.



SECTION 2

Personal Safety Equipment

Clothing

YOU ARE A CHEMICAL PLANT WORKER and the clothing you wear is important to your safety and health. Wear clothing suitable for your job. In this way you will protect yourself against ordinary Plant hazards such as corrosive and hot liquids, chemical dusts, burns, etc. Check your clothing against the following items:

- Wear only safe, well-fitting garments. Torn, ragged, loose, sloppy clothing is unsafe. Shirt tails should be worn inside your trousers. Excessive cuffs on shirt sleeves and trousers should be properly shortened.
- A hard hat or cap should be worn for head protection in sodium shops and operating areas where physical work is in progress. Offices, lunch rooms, etc., are excepted unless otherwise posted.
- Perforated shoes, sandals or sneakers are not permitted in the operating, shop or storage areas of the Plant unless prescribed by Plant Medical. It is desirable that all men in the Plant wear safety shoes. They protect your feet. Work shoes worn in the Plant shall not be taken off-Plant unless approved by a member of supervision.
- The type of clothing to be worn is determined by the condition of the job or the area in which you are working. Your immediate supervisor will see that you are properly equipped for your maximum protection.
- All employees should wear clothing issued at the time of employment. Each employee is assigned two change house lockers, one for *work* clothing and one for *street* clothing. Do not change lockers without securing permission or receiving instructions to do so from your supervision.

Gas Masks

- Gas masks are used for removing harmful gases out of the air you breathe. Gas masks are available for all employees needing them. Your immediate supervisor will instruct you.

Safe Practices for Gas Masks

- Know the proper kind of gas mask to use in your work and learn how to wear it. Your immediate supervisor will instruct you.
- Canister type gas masks should *not* be worn when there is a deficiency of oxygen. Never enter a closed chamber with a canister gas mask until you have made certain that the air contains a sufficient amount of oxygen.
- Familiarize yourself with the location of masks and with the procedure on gas mask use in your area.

Instructions for Use of Gas Masks

When using gas masks from emergency cabinets, follow these directions:

- Remove mask from sealed paper bag. Be sure the seal has been removed from the bottom of the canister.
- Adjust the neck or head straps to fit properly.
- If full face-piece mask, be sure it fits tight by testing.
- Check the mask for proper fit by clamping down on corrugated hose with the hands and inhaling. If no air leaks in around the face-piece, the mask fits correctly.
- Be sure gas masks are returned for servicing in your area.

Respirators

Respirators are used for filtering particles out of the air you breathe. Respirators are available for all employees needing them. Your immediate supervisor will instruct you.

- Operating instructions and safety rules require respirators to be worn on certain jobs.
- The respirator must fit snugly to the face and be in good working order. The filters must be changed at specified intervals. Your immediate supervisor will instruct you. If respirator does not permit comfortable breathing of pure air, report the condition to your immediate supervisor immediately.
- When not in use, keep each respirator clean by placing it in the cardboard box.
- If used respirator is not issued personally to user, it must be returned to designated location for servicing.
- Respirators must not be substituted for gas masks.

Fresh Air Masks

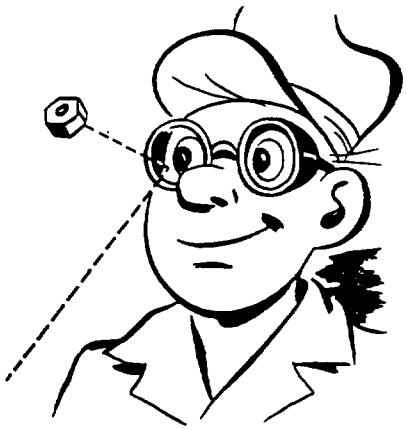
- For heavier concentrations of gas, fresh air masks are provided. The air to these masks is supplied from fixed connections or from portable blowers. Your immediate supervisor will instruct you when and how to use these masks. For emergencies, self-contained oxygen masks are also available.

Goggles

Your eyes are your most precious possession. Most eye injuries can be prevented because practically all of the hazards to eyesight and the means for preventing eye injuries are well known. Goggles protect eyes! Two general types are provided for your protection; namely, cup-type goggles and safety spectacles. Goggles or spectacles are furnished all employees who need them. Your immediate supervisor knows the type of eye protection required for your work. Protect your eyes by observing the following safe practices:

- Wear cup-type goggles when exposed to severe eye hazards, such as:
  - Handling injurious chemicals.
  - Working with or pouring molten metal.
  - Working on any grinding or chipping operation.
  - Breaking up concrete or masonry.
  - When required by the safety rules of the Plant or shop in which work is to be done. Certain areas, such as around acid pumps, are designated as "goggle" areas, and are so posted. Goggles must be worn even when walking through these areas.
  - When working near any operation where particles of material may drop, fly, or be blown into your eyes. As a general rule, goggles must be worn when striking metal against metal.
- Goggles must be carried on your person and be available for immediate use when entering operating and shop areas.
- Safety spectacles, having hardened lenses for frontal eye protection against mechanical hazards, are required to be worn in certain areas, such as the Machine Shops and Laboratories. Safety spectacles must not be substituted for cup-type goggles, where the latter are required or specified.
- Special welder's goggles are furnished welders and burners. Spectacles with dark lenses are provided workers or helpers working near such operations. Do not look directly at an electric arc or flame.

- For maximum eye protection, your goggles must fit properly. If they do not, report to your immediate supervisor who will arrange to have them fitted properly.
- Do not swap or borrow goggles or spectacles. They are fitted to you personally.



- Keep your goggles clean. Use the goggle cleaning station in your area, or just plain soap and water.
- Wear your goggles with the strap just above the ears and behind the head. The head band should never be worn over the cap.
- To prevent foreign materials deposited on goggles from entering your eyes when removing the goggles, proceed as follows:
    1. If you have received a splash of chemical in your face, remain bent over and get assistance to a safety shower or eye fountain. Wash face thoroughly before removing goggles.
    2. Remove mitts or gloves.
    3. Slip the thumbs under the straps behind the head.
    4. Bend the body and head forward.
    5. Raise the straps over the back of the head and the goggles will fall away from the face.

If your goggles or safety spectacles fog excessively, anti-fog compound should be applied to the lenses. Anti-fog compound is available at the goggle cleaning stations located in your area.

Safety Equipment

The Company furnishes, or makes available, for your protection such personal safety equipment as is required for unusual working conditions. To be effective, equipment must be kept in good repair and used when required by safety rules and operating instructions or when otherwise necessary. Your immediate supervisor will instruct you on the safety equipment needed for your job.

Gloves

Gloves protect your hands from cuts, bruises, chemical burns, etc. There are various styles, each designated for a specific type of job. Wear the correct style for your job. Here is a general list to guide you:

- Pure rubber gloves are for handling corrosive chemicals.
- Rubberized canvas gloves are for wet mechanical jobs or where contact with acid may be encountered.
- Electricians' rubber gloves are for use on electrical equipment only. Leather protection must be worn over them.
- Welding gloves are for use on all burning and welding operations.
- Moleskin mitts are for special jobs where heat and sodium are encountered.
- Leather gloves are for mechanical and operating use.

- Coated plastic gloves are used to protect the hands against contact with toxic chemicals.
- Asbestos gloves are for use where extreme heat is encountered.
- Gloves must not be worn while working with or around moving machinery, such as drill presses and grinding wheels. (Any exceptions must be specifically approved.)

Safety Harness

Safety harnesses must be worn for protection when working in hazardous locations such as:

1. On peak roofs, or on sloping roofs which are not protected by a railing.
2. In tanks, tank cars, or closed chambers. (Any exception must be specifically authorized.)
3. At high elevations when full protection such as platforms and railings are not provided.
4. In locations where there is danger of falling if overcome by gas or fumes, or slipping into a pit.

- When a safety harness is worn, the life line must be securely snubbed off as short as possible. When doing work in closed places, such as inside a tank, a fellow employee must attend the life line to provide assistance if necessary.
- Life lines must be checked daily before use. If an imperfection is noted, a new line must be procured.
- Never depend on a safety harness until you have thoroughly inspected the harness and chain.
- The harness must fit close to the body and should preferably be worn around the chest.

Safety Showers

- Safety showers are provided for immediate first-aid treatment of chemical splashes. They may also be used for extinguishing clothing fires.
- Safety showers must be tested at least daily by the operating personnel to insure their operation and accessibility at all times.
- Showers which are defective or inaccessible must be reported immediately to your immediate supervisor.
- Learn the location of the showers in your area; you may have to use one some day.

Eye Fountains

- Eye fountains are located throughout the operating area and are usually attached to drinking fountains or safety shower risers.
- Consult your immediate supervisor on their location and use.

Skullguards

- Skullguards or hard hats provide head protection. They must be worn on construction, rigging, steel erection and other jobs where unusual head hazards exist.
- Certain areas are designated "hard hat" areas and are so posted. Head protection must be worn in these areas.
- Your immediate supervisor will advise you when such protection is necessary.

SECTION 3

Housekeeping

GOOD HOUSEKEEPING is a basic part of accident and fire prevention. Good housekeeping is more than cleanliness. It is cleanliness and order. Have a place for everything and keep everything in its place. Cultivate the habit of good housekeeping. Good housekeeping can be maintained by observing the following practices:

- All working areas should be kept clean and free from obstructions at all times. Tools, loose objects, oil, grease and other materials are tripping or slipping hazards.
- Clean up your work place immediately after finishing a job and at the end of each shift. This is part of your job.
- Remove projecting nails or screws from all boards or scrap material.
- Spilled toxic or corrosive chemicals should be cleaned up immediately. Consult your immediate supervisor for the methods and materials to use for the safest way to clean up spills.
- Help keep our roads, walks, and yard areas clean by depositing refuse in the handy "Refuse" cans or containers.
- Storing materials within aisleways or overhead is an unsafe practice, and must not be done.
- Never place equipment, tools, etc., on stair treads. This creates a tripping hazard.
- Your locker should be kept clean at all times. All unnecessary clothes and equipment should be disposed of.
- Discard excessive combustible materials by placing these in the proper waste cans provided.
- Material contaminated with hazardous chemicals should be placed in special receptacles provided for such waste (consult your immediate supervisor).
- Fluorescent light tubes require specific handling by qualified personnel and must not be handled by anyone not authorized to do so.
- Any other rubbish, such as rags (except oily or contaminated rags), paper, etc., may be placed in any other waste receptacle.

No job is considered complete until it is cleaned up.

SECTION 4

Equipment and Materials

Pressure and Thermal Safety Devices

Never close a valve ahead of a relief valve or block thermal safety devices unless specifically instructed to do so by your supervision.

Compressed Air

Never play with compressed air or apply it to any part of the body or clothing.

Warning Signs and Danger Tags

Warning signs are important for they warn you and your fellow employees of existing dangers and hazards. Danger tags are for your personal protection when working on Plant equipment. Signs and tags must be used and respected at all times.

Warning Signs and Barricades

- Warning signs are placed to advise of any existing hazards. Watch for them and heed them.
- Use signs only where hazards exist. If the work you are doing creates a hazard, warn your fellow employee by posting adequate warning signs. You would expect him to warn you. Use a sign having the proper wording. Remove the sign when the hazard ceases to exist.
- Barricades are to be used whenever it is necessary to protect an individual or equipment from existing hazards. Watch for them and do not go through such areas without the proper permission.
- Roped areas are not to be entered or passed through by any person unless he is authorized to do so.
- Observe and heed all posted signs, barriers or other warnings.

Overhead Work

- No one is to enter an immediate area where overhead work is being done unless absolutely necessary, and only then after his immediate supervisor has arranged for him to do so, and hard hat is worn.
- When working overhead, precaution must be taken to protect the area below by roping off, barricading, or clearly posting the area.
- Only first-class rope or chain shall be used overhead. All condemned rope shall be destroyed.
- Sash cords shall be used for all barricaded work. Red bunting strips should be attached to attract attention.

- Special permission must be obtained from your immediate supervisor to work beneath overhead work.
- Unfinished openings in the floor or ground must not be left unguarded.

Danger Tags

- Danger tags shall be used for tagging out electrical circuits or equipment being worked on. These danger tags shall be used to notify all persons concerned that the circuit or equipment *must not* be operated while the tag remains attached. Honor a fellow employee's danger tag. Not to do so may mean his life.
- Every group working on the equipment must use an individual danger tag.
- Danger tags must not be removed except by the individuals whose names appear on the tag. Only the top supervision can make exception to this rule after a personal inspection.
- These tags are valid for one shift only and must be removed or transferred before you leave the Plant. If the job carries over into another shift, the man who relieves you must fill out a tag on the equipment in your presence in the space provided on the tag for this purpose.
- Remove your danger tag when work is completed and advise supervisor in charge of equipment that it is ready to operate.

Caution Tags

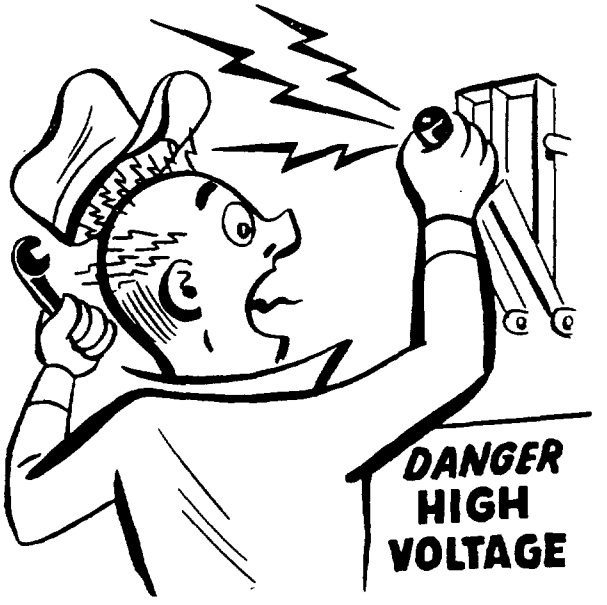
- Caution tags are used to tag out equipment not ready for use when no one is working on it. Caution tags may be removed by any authorized person after he has made certain that the equipment has been made safe to use or operate.

Electrical Equipment

Electricity, properly used, is an indispensable aid. When improperly used, it is extremely hazardous. Everyone is susceptible to electric shock. Under certain conditions, contact with 25 volts has caused fatalities. When operating or working on electrical equipment or circuits, follow the Plant safety rules, which are:

- Employees not authorized to work on electrical equipment are forbidden to do so. If electrical trouble develops, contact your immediate supervisor right away.
- In all cases of minor electrical shock, however slight, the employee should report the case to his immediate supervisor at once.
- Treat all circuits as though they were alive even though you know them to be dead.

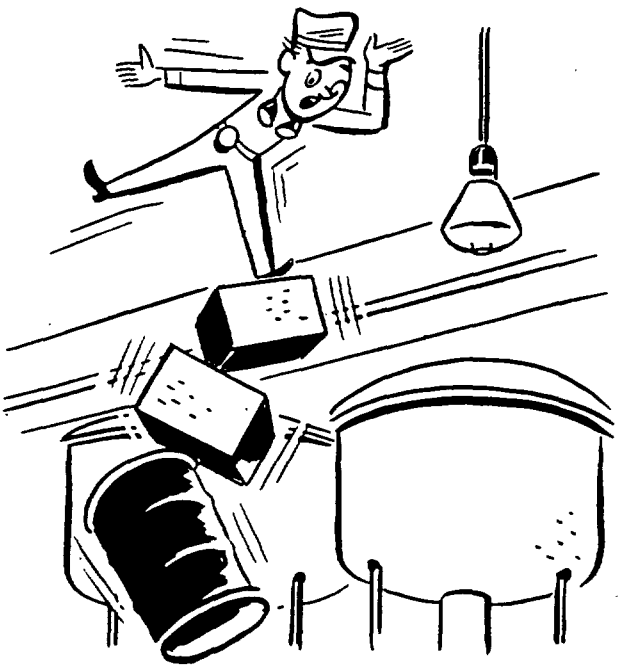
- All electrical hazards are marked with suitable warning signs. Observe these signs.
- Electric wires which seem to be unused or hanging free from overhead structures may be alive and dangerous. Report them to your immediate supervisor promptly. Do not touch them or permit anyone else to do so.
- No unauthorized person is allowed to work on or near unprotected electrical equipment. Work of this nature is done only after a standard procedure is followed.



- Form the habit of operating motor starters and switches with your left hand. The handles of switches and starters are generally on the right side and your body would be out of direct line if a flash should occur. Close or open the switch quickly and firmly. Never pump the starter handle; if the motor fails to start, notify your immediate supervisor.
- If a starter is operated by a push button, the push button must be released immediately after contact is made. Do not hold or block the button down. Do not continue to operate the push button for any length of time after the starter has "kicked out." Call your immediate supervisor.
- No work is done on a live circuit until after a standard Plant procedure has been followed. This includes approval and presence of authorized persons.
- Grounding connections on electrical equipment are essential to safety and fire prevention. See that they remain intact and in good condition. Report broken or defective grounding immediately to your immediate supervisor.

Scaffolds

- The use of barrels, boxes, drums or makeshift devices is strictly prohibited.
- Approved safety planks only shall be used for scaffolding or staging and for no other purpose. These planks are to be clearly identified with a 1-foot-wide green stripe. A ⅝-inch bolt shall be installed through each end. For test purposes, support the board to be tested, 1 foot from each end with a 500-pound weight suspended from the center. Be sure the sag is less than 1 inch on an 8-ft. board; 1⅛ inches on a 9 ft. board; 1¼ inches on a 10-ft. board; 1½ inches on a 12-ft. board; 2¼ inches on a 14-ft. board; and 3¼ inches on a 16-ft. board. Each safety board should be retested when the visual check reveals defects.
- "A" frames and scaffolds, regardless of height, with centers of supports up to 8 feet, shall have working platforms one plank thick and three planks wide (Safety Planks.)



- "A" frames and scaffolds, regardless of height, with center supports more than 8 feet apart, must have working platforms two safety planks thick and three safety planks wide. This does not apply to staging which may be used singly. (Pencil staging for Painters.)
- All planks and staging must extend at least 6 inches and not more than 18 inches beyond their supports and be securely wired with No. 12 gauge wire.

- Safety planks shall be of the following standard lengths: 8 ft., 9 ft., 10 ft., 12 ft., and 16 ft. and shall otherwise conform to Ethyl Corporation Engineering Standard AG-8-2.
- All safety planks which have come in direct contact with acid, or are contaminated as determined by supervision, shall be destroyed.
- A safety plank shall never be nailed or attached in any manner other than by wire.
- Safety planks—which are clearly identified with a green stripe one foot wide on each end—or approved steel safety plank are the only type of planking which may be used in scaffolds, temporary platforms or any elevated working platforms. The only exception to this rule may be made—and then only by proper supervision—in the case of wooden scaffolds of a semi-permanent type.
- Safety planks are to be stored under cover, off the ground, supported from underneath in such a manner that sagging will not occur.
- Areas below scaffolding shall be roped off in a manner preventing any passage whatsoever directly beneath and in a reasonably adjacent area.
- Whenever possible and practical, scaffolds shall have a hand rail not more than 42 inches high and not less than 34 inches high on all four sides above the outer perimeter of the working platform. (Safety Planks.)
- Whenever possible and practical, standard toe boards of 5½ inches high will be installed on scaffolds of one section high or higher. These boards should be installed along the top outside edge of the working platform. (Safety Planks.)
- No material is to be thrown from the ground to the platform of the scaffold or from the scaffold to the ground. Raise or lower the material by a hand line, chain hoist or crane, depending on weight.
- Swing scaffolds shall be of the approved type and must be suspended in accordance with the area regulation. They should be tied to the structure to make them more stable.
- Patent tubular scaffold must be erected carefully, and must be thoroughly inspected by the immediate supervisors before being used.
- *Wooden scaffold*—The use of this type of scaffold should be discouraged and kept to a minimum. If used, it should be erected according to Engineering Department Standard No. AG-8-1.

- No scaffold shall be used as support for heavy materials.
- "A" frames of only the approved type shall be used. Where used as ladders, the workmen shall not stand on the top cross-piece.

Ladders

- Only approved type ladders shall be used.
- All ladders shall be checked out of the tool room and shall be returned to the room at the close of each shift.
- All straight ladders must be held when not tied.
- The distance from the base of the wall to the base of the ladder shall not be greater than 25 percent of the ladder length.
- All ladders are to be equipped with a 9 ft. length of ⅛-inch chain, connected to the second rung from the top.
- Never place a ladder in front of a door opening toward the ladder, unless the door is posted with a warning sign, barricade or watchman.
- Always face the ladder when ascending or descending, and never attempt to reach too far in any direction from the ladder.

- All defective ladders or scaffold equipment must be returned to the ladder rack at once and tagged for repair.
- All straight ladders are equipped with rubber safety shoes to prevent slippage on concrete floors.
- Test on single ladders:
    a. Support the ladder horizonally at points six inches from each end.

b. Apply a load of 200 pounds at the center line.
c. Deflection should be 2¾ inches for a 12 ft. length to 44 inches for a 46 ft. length.
d. Test ladder rungs for soundness by tapping with 1¼-pound hammer.
e. For marking, stencil "M" and number on each ladder.
f. Test ladders every three months.

- When using a ladder with spud type safety shoes on concrete floors, the ladder must be set on a 2" x 6" board to prevent slipping.
- When working higher than 10 feet above the ground, scaffold should be used whenever possible. If ladders are necessary, a safety harness should be worn. The harness should be tied off to the ladder, which, in turn, is tied off to the supporting structure, or is held.

Stepladders

- Only an approved stepladder may be used.
- It must be checked before use to be sure it is serviceable. Unserviceable ladders must be tagged out and returned to the tool room.
- Ladder should be placed on a firm footing, braces locked.
- Never stand on the top step.

Working Platforms

- These platforms are provided in areas where they are needed and must be used as specified in departmental rules.

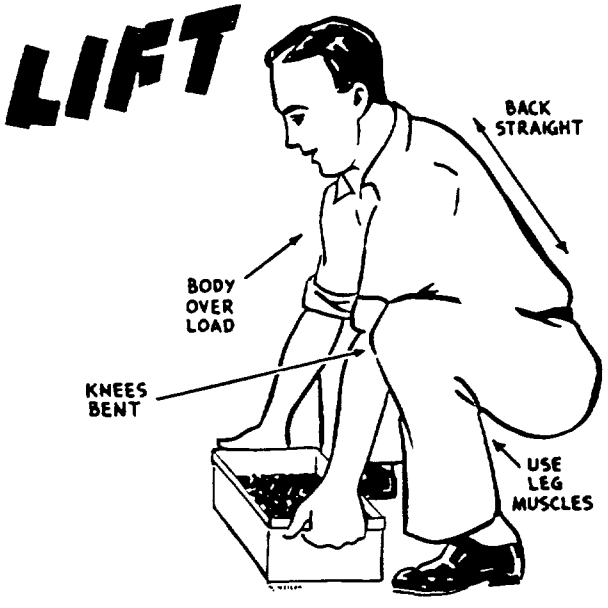
Lifting and Handling

Improper lifting and handling of materials is the direct cause of many injuries. If these injuries are to be avoided, consideration must be given to several factors, including the weight to be lifted, size and shape of the object, and the method of lifting. Safe practices for handling and lifting materials are as follows:

Manual Handling and Lifting of Materials

- You should wear serviceable gloves and safety shoes on jobs involving the handling of materials.
- Make it a habit never to lift an object of any sort until you have some idea how heavy it is. Try the load to make sure you can safely handle it.

- Do not attempt to lift or move objects which are too heavy or bulky for you, or which require you to get in an awkward position. Ask for help.
- Make sure you have a firm grip on the object before starting to lift it. Be sure your hands and body are in the clear.
- Learn to lift the safe way. Bend your knees, keep your body erect, grasp the object firmly, then push upward using the leg muscles. It is easier and safer.



- Look for slivers, nails, sharp ends, etc., when handling materials or packages. If possible, remove them.
- In carrying pipes longer than 10 feet, at least two men are required and each should carry on the same shoulder and walk in step.
- To roll drums, use the hands, pushing against the side. Keep your hands clear of the end chime and also the side plug. Do not use your feet to push or change direction of a rolling drum.
- When handling a carboy, examine the box to see that it is in good condition. The glass bottle might easily be broken if the box is defective. Do not use carboys unless the box is in good condition. Report any defects to your immediate supervisor.
- Many injuries result from improper stacking of materials. For maximum safety see that each pile has a firm foundation and cross-tie for stability.
- When piling materials in buildings, stay within the permissible floor loads. Check this with your immediate supervisor.

- Keep the size of each pile within safe limits, and maintain adequate aisleways to exits and access to fire equipment, safety showers, control valves and switches.
- Always be sure you have clear vision when carrying material.

Ropes, Chains and Cables

- Inspect ropes before using. Look for abrasions and broken fibers. Untwist the rope in several places. If black or rusty brown spots are noted, they may indicate chemical burns. Do not use a rope you believe to be defective. Do not take any chances. Notify your immediate supervisor.
- Keep ropes off the floor and out of contact with acids, alkalies and other chemicals. Tag out any rope suspected of containing chemical burns and report same to your immediate supervisor. Ropes are damaged by being dragged over sharp objects or equipment. Protect ropes from excessive temperatures.
- Inspect all chains, hooks, and cables before using. If such equipment is worn or frayed, it must not be used. Return defective equipment to the tool crib or rigger's loft for repair and notify your immediate supervisor.

Overhead Cranes and Hoists

- Do not operate cranes or hoists unless you are authorized to do so. Operators should test all controls and brakes at the beginning of each shift or when starting to use them.
- Do not use a defective crane or hoist. Report it to your immediate supervisor.
- Never stand or walk under a crane load. Obey the men handling the load from the floor. When entering a shop or building, look for the crane or hoist. Determine its location before crossing the floor.
- Know and understand all hoisting signals. Do not move a load until you are sure it is safe to move it. Do not distract attention of crane operators while they are operating cranes.
- Loads should not be moved over the heads of men.
- Suspended loads must *not* be left unattended.
- Whenever a crane operator leaves the crane, he must place the controls in the "off" positions and apply the brakes.
- Stay clear of overhead loads. Stand to one side, use a rope to guide the load.
- Never work under a suspended load.
- No one is permitted to ride the load or hook unless specifically authorized to do so and after a standard procedure is followed.

Machinery and Guards

Safety guards are for your protection. Keep them in place at all times when equipment is being used. Be alert around moving machinery. Guards are not foolproof. Unauthorized removal of or tampering with safety guards is forbidden. Here are regulations to follow:

- Remove machine guards only after permission is received from the immediate supervisor and the machine is shut down and tagged out. Replace guards properly as soon as repairs are finished. Do not start a machine until you have checked and made sure that all guards are properly replaced.
- When using machinery, make sure the guards are in place and operative.

- Report immediately to your immediate supervisor any grinding wheel or grinding wheel guard that appears to be defective. The tool rest should be within ⅛-inch of the wheel. All grinding wheels must be provided with "Perks" safety washers.
- All machine drives should be carefully enclosed. If you find machines and machine drives which are not adequately protected, report them to your immediate supervisor.
- Working within reach of an unguarded moving shaft, gear, pulley, belt or chain drive is prohibited. Any exception must be authorized specifically.
- All machinery must be shut down for oiling unless the grease or oil cups are located outside the guard or are not near moving parts.

- Be thoroughly familiar with equipment before you attempt to operate it. Never operate machinery or equipment unless you are instructed and authorized to do so.

Power-Driven Equipment

- Motor vehicles, motors, cranes, hoists, elevators, jitneys, tractors, tow motors, pay loaders and other power-driven equipment are to be operated only by authorized and trained personnel.

Tools

A safe worker uses only tools which are in good condition. Make sure that each tool you use is the proper one for the job. Improper and defective tools contribute to accidents; they waste material and time. Observe the following safe practices:

- Always take the time to obtain the right tool for the job.
- Make sure of your footing before using any hand tool. Also make sure that all parts of the body are in the clear.
- Do not use tools having split handles, mushroomed heads, worn jaws or other defects which make them unsafe. Report defective tools to your immediate supervisor. He will have them repaired or replaced.
- Do not use makeshift or improper tools. Obtain or have tools made which are correct for the job.
- Store your tools properly when not in use.
- "Clamp tongs" save many hands and fingers. Use them when holding a "Buster Point" or chisel bar when required.
- See that the pneumatic tool you are using is provided with a "keeper." It will keep the bit from being ejected.
- When working with pneumatic tools be sure connections are made to *air* supply. Never kink the hose to shut off air supply; use the air line shut-off valve.
- When a pneumatic tool is not being used, close the air line valve and lay the tool down so it will not fall over. Open valve on air tool to relieve pressure in hose before disconnecting.
- Mitts or gloves must *not* be worn when using portable tools having exposed rotating parts. Any exceptions must be specifically authorized.
- Check electric tools for defective cord insulation, poor connections and defective plugs before use. Report defective portable tools to your immediate supervisor. Repairs to electrical equipment must not be made by unauthorized persons.
- The ground on portable electrical tools is provided through a three-way plug which is standard on the Plant. Do not use a portable electrical tool which is not grounded.

- When using electric extension cords, see that they are properly supported. Cords are easily damaged when hung over nails or sharp edges, or when kinked or left where trucks may run over them.
- When working overhead, make sure that tools cannot fall to lower floors. Do not leave tools on overhead ledges, building steel, window sills, etc.

- Use spark-proof tools where there are hazardous explosive vapors or gases. If possible, wet the work down. Your immediate supervisor will advise you on such jobs.
- When carrying tools, use care to avoid injury to yourself or others. Sharp or pointed hand tools should not be carried loosely or in pockets. These should be carried in a tool bag.
- All files must be fitted with wooden handles.

Entering and Working in Vessels, Tanks, Manholes and Bins

In order to assure protection of personnel when entering and working in vessels, tanks, manholes or bins, the following safety rules must be rigidly observed:

Entry: The following rules apply to all closed vessels and to all open vessels deeper than five feet. "Closed vessel" shall be construed to mean all pieces of equipment which must be entered through a manhole or other constricted opening.

These rules do not apply to vessels being fabricated in the Shops or in areas under construction where operations have not been started, so long as the top of the vessel is open and suffi-

cient air is being supplied. However, as soon as any part of the operation is started, or if new construction is to be tied into equipment already in operation and it becomes necessary for men to enter such vessels through a manhole, these rules apply regardless of where the vessel may be located.

- NO VESSEL, TANK, MANHOLE OR BIN ON THIS PLANT IS TO BE ENTERED WITHOUT PERMISSION OF THE SUPERVISOR OF THE AREA INVOLVED OR OF THE ASSISTANT PLANT MANAGER.
- Operating personnel will have completed preparatory steps, such as emptying, cleaning, purging and testing all vessels, prior to the time Maintenance personnel enter a vessel.
- All process and utility lines under pressure attached to the vessel must be disconnected or blanked before any one is allowed in the vessel.
- In any case where it is impractical to disconnect a manifold, vent stack, ventilating duct, or line, such line will be blanked or plugged in such a manner as absolutely to prevent the flow of process air, gas or liquid in or out of the tank or vessel.
- Where the vessel is equipped with feed or discharge chutes of any kind, the chute should be guarded so as to prevent material of any kind from entering the tank or vessel while it is under repair.
- When vessels have been purged, lines made inoperative, etc., the Laboratory must be requested to check the atmosphere in the vessel to determine the oxygen content and the presence of fumes or vapors, and submit a written report of their findings to the supervisor requesting the report. If there is a dangerous concentration of flammable vapors, work must not be started until these vapors have been eliminated. A deficiency of oxygen will be corrected by forced ventilation. Never use Plant air for forced ventilation.
- Only approved type of explosion-proof lights operated on a 6-volt system shall be used in vessels, manholes, tanks and bins.
- The possible hazards of gas leaks from torches or hose, the depletion of oxygen by torches, flame or other causes, and possible harmful gases from arc welding, in closed or partially closed places, must be guarded against by the use of forced ventilation.
- At least one man must be stationed outside at the manhole of any vessel in which men are working, excluding boiler fire box or fire water tower. The men inside should frequently assure themselves of the presence and alertness of their tender.
- If supplemental special area instructions are required, they must be included in addition to the above.

Safety Equipment Required

- Life belt and line shall be worn in all vessels with the following exceptions, in which cases their use may be waived at the discretion of the supervisor of the area involved or of the shift superintendent:

  Certain designated equipment in which the use of a line may prove a distinct hazard.

  Vessels having a small entrance in which the use of a harness and line would hamper a man passing through the entrance.
- When two or more men are working in a vessel, each one must wear a harness. (However, the life line does not have to be attached to the harness if it seriously interferes with the man's movements.) In such cases, the line may be allowed to hang inside the tank so that it can be readily attached onto the harness in case of emergency.
- Fresh air masks (cannister-type masks are not to be used for tank work), goggles, gloves, and rubber boots are to be worn at the discretion of the supervisor in charge.
- For rescue purposes, an employee must be prepared to enter the vessel wearing a cannister mask, or a fresh air mask if forced ventilation is not used, and a harness and life line.
- Life lines shall be made of ¾" manila hemp rope or a chain. When in use, the free end of the life line must be made fast to a fixed object and the slack shall not be allowed to rest on the bottom of the vessel.
- In the case of agitator equipment in a vessel, the pulleys must be chained or the belt removed from the pulley. In the case of direct drives, follow the safety rules for the use of Danger Tags.
- Use the rules stated here as a guide to safe working. Use GOOD JUDGMENT along with these rules in cases not specifically covered in this booklet.

Safety Rules—Handling Lead

- Gloves and "Sanky" foot guards must be used when handling pig lead.
- Before a boxcar is opened for unloading, the blue spot and derail procedure must be followed.
- Doors on boxcars must be opened in the presence of the immediate supervisor.
- Ramp from platform to car must be properly placed.

- Safety stop-timber must be placed in the opposite door before starting truck operation.
- Any fumes in lead cars must be reported immediately to the immediate supervisor.
- Hazards encountered are:

  Upset piles of lead.

  Soap and grease on the ears of the pig lead, making them slippery.

  Burrs under pig ears which may snag the gloves of the handler.

- If the pigs are banded, cut and handle bands carefully.
- When separating the pigs from a spilled pile of lead, a lead pick must be used.

- Physical fitness, proper position and alertness are important features of this job. Keep the feet firmly on the floor, grasp the ears of the pig firmly and place it on the pile using thigh, leg and arm muscles (not the back). Do not twist your body, and be sure the hands and feet are in the clear at all times.
- Employees must not jump from car or platform to the ground. Use the ramp.
- Do not climb on or between cars.
- Keep fork lift vehicles in good repair.
- Only qualified men should be allowed to operate these vehicles. These vehicles must be operated with care.
- Always back down ramps when the fork lift truck is loaded.

Safety Rules—Handling Lime

Lime is a skin irritant so safety equipment *must* be worn for body protection.

Unloading Lime from Boxcars

- Before opening boxcar, the blue spot and derail procedure must be followed.
- All parts of the body must be covered. Use the following equipment:
  Head, eyes and neck: Goggles and a respirator and towel with exposed skin surfaces protected with Vaseline.
  Body: A plastic apron must be worn over the regular clothing.
  Shoes: Shoes must be in good repair.
  Hands: Gloves must be worn with gauntlets over the sleeves.
- As lime is in powder form, it must be handled with care to eliminate as much dust as possible.
- If any irritation is felt on any part of the body, this fact should be reported immediately to the immediate supervisor and then to Plant Medical.

Safety Rules—Chlorothene and Carbon Tetrachloride

Carbon tetrachloride is not to be used as a solvent without special permission of the supervisor of the group requiring its use. Permission can be given only for an individual job.

REMEMBER—Carbon tetrachloride is far more toxic than Chlorothene. The following safety rules must be practiced:

- Always wear goggles when working with Chlorothene or carbon tetrachloride.
- Wear plastic gloves to protect the hands. This can prevent chapping or dermatitis.
- When using Chlorothene or carbon tetrachloride as a solvent, work should be done in a well-ventilated area assuring that the fan takes the vapors away from the worker.
- Store Chlorothene and carbon tetrachloride in closed containers and well-ventilated areas.
- Rags saturated with Chlorothene or carbon tetrachloride should be put in self-closing trash containers or outdoor trash containers.
- If clothes become saturated with Chlorothene or carbon tetrachloride, change them immediately.

- In the event a person has been subjected to concentrated Chlorothene or carbon tetrachloride fumes, he should be moved into the fresh air and medical aid summoned immediately.

Safety Rules—Ethylene Dibromide

Ethylene dibromide is a clear, colorless liquid with a characteristic sweetish odor. It is more than twice as heavy as water (S.P.G. 2.18). Like other organic solvents, it can cause severe burns when kept in contact with the skin. It is also poisonous when absorbed into the system and must, therefore, be handled with extreme care.

The following safety rules must be practiced:

- Do not breathe vapors. When necessary to work in an atmosphere containing ethylene dibromide fumes, wear an air or gas mask.
- Wear goggles, rubber gloves or other gloves which are impervious to organic solvents. Rubber overshoes and rubber pants must also be worn to insure complete foot and leg protection.
- Leather shoes which have come in contact with ethylene dibromide should be reported immediately to the immediate supervisor. He will notify the proper authority (contaminated clothing inspector or operating supervisor), who will inspect the shoes and replace same if saturated.
- Do not allow the liquid to come in contact with the skin. If it does, wash it off immediately, first with kerosene and then with soap and water.
- If the liquid is spilled on the clothing, remove the clothing as soon as possible and wash the skin thoroughly with kerosene, followed by soap and water. Then report to the Plant Medical office and your immediate supervisor. Do not wear the clothing again until it has been laundered.
- In case it is necessary to handle ethylene dibromide in sample quantities, use the fluid sample carriers or a tightly closed metal can, preferably a safety can.

Safety Rules for Working on Acid and Caustic Lines and Equipment Containing Corrosive Material

All Acids

- Permission must be obtained before any work is done on acid or other equipment containing corrosive material. The permit must be obtained immediately prior to beginning the actual work.

- The nature and condition of the equipment and the proper method of procedure must be discussed with the person giving permission to begin the actual work. No work shall be started until the workman understands the hazards of the particular acid being handled and the status of the equipment with respect to draining, flushing, blanking or other safety measures. Preparatory measures will be carried out by the Operating group before turning equipment over to the Maintenance group.
- The area adjacent to and below that being worked in must be roped off and adequately marked with warning signs.
- Before actual work is started, suitable equipment must be provided to take care of acid spills. A running stream of water from a hose *must* also be supplied.
- The safety shower located nearest the work must be checked and the shower tested before starting work.
- A minimum of goggles or acid hood, gloves and overshoes must be worn at all times while working on any line, valve, pump or any other piece of equipment which is in acid or corrosive service; also when working on equipment which has been removed from such service until it has been thoroughly washed, dismantled and inspected and found to be free of acid. Never put in your pockets tools which have been used on acid equipment. Certain jobs may require that additional equipment be worn. Always follow the specific rules of the acid area in which you are working.
- In the event of a splash from acid or corrosive material, the *goggles must not be removed from the eyes until after the face, forehead and goggles are free from acid and the hands have been thoroughly washed with water.*
- Full acid clothing consisting of rubber hood, rubber suit (coat and pants), rubber gloves and rubber boots is to be worn whenever the nature of the work demands special caution, such as breaking into equipment, handling acids whenever such equipment could be under pressure or whenever working in congested quarters where a ready exit is impossible.
- No piece of protective clothing splashed with acid or corrosive material is to be removed from the body until the clothing has been thoroughly washed with water.
- Individuals working on corrosive equipment shall stand to one side and above the point being worked on. If this proves impossible, special precautions must be taken. Flanges shall always be broken in a cautious manner and away from the workman. All individuals working on corrosive equipment shall assume that it is full of acid under pressure until the work is completed.

- Electrical equipment connected in any way with the repairs must have the fuses pulled and be properly tagged or locked by an electrician before work is started.
- Suitable blanks shall be installed on either side of the acid equipment being worked on.
- *Protective equipment removed because of repairs such as lead or plastic flange covers, hood over valves, guards for glasses and meters and drip pans must be replaced before the job is considered ready for service.*
- All valves which must be closed before the repair can be made, must be properly tagged.
- All acid spilled and all equipment removed from service shall be neutralized or flushed with water before the job is to be considered complete.
- No welding or burning shall be done on any acid equipment until after it has been thoroughly washed and flushed with water. A gas test should be made to check the presence of hydrogen. Lines must be purged, re-tested and free from gas before the "flame permit" is issued to cover work.
- All acid clothing must be thoroughly washed with a generous supply of water under a safety shower before it is removed from the body.
- Acid clothing may be procured from the tool room, and the clothing must be washed inside and out before being returned to the tool room. It must be kept in repair and must not be issued if it will not give complete protection.

Barricades

- Barricades should not be placed without the knowledge and permission of the area supervision. When in an emergency, it is necessary to do so without permission, area supervision must be advised as soon as possible.
- Roads must not be blocked until the Operating supervision and Patrol have been notified. When the block is removed, they should again be advised that the road is clear.
- Barricades must be placed before starting work and removed as work is completed or when the hazard has been eliminated. Those in outside areas or dark locations must be equipped with lights.
- All barricades should be marked with appropriate portable warning signs at normal approved points. Rope, when used, should have red streamers attached to it at 6-foot intervals with sufficient standards to keep rope 4 feet above ground level.

- Passageways must never be blocked with barricades until appropriate warning signs are in place. When doors, stairways, elevators, ramps, safety chutes, etc., are barricaded, warning signs must be placed to prevent people from using the hazardous facility.
- Only authorized persons will be permitted to enter a barricaded area. When necessary to enter a barricaded area, go under the rope rather than stepping over it.
- All uneven or slippery surfaces, holes, open ditches, leaky lines, unguarded machinery and repair work should be barricaded or posted.

Overhead Work

- Wooden fencing equipment with mid-rail and toe boards must be installed around all openings in floors where above the ground level. Such barricades shall be appropriately marked at all approaches with proper warning signs. Areas endangered by falling objects must be blocked off to prevent persons from passing through them, and, in extreme cases, men must be posted to warn fellow workmen of danger.
- No one is to enter an area where overhead work is being done unless absolutely necessary and then only when his supervision arranges for the person to do so.
- Work on a lower level is not to be done without the full knowledge of men working on higher levels, and then only after all

safety precautions have been taken to prevent falling objects. The men working below will also wear hard hats. *Work on lower levels while work is in progress above should be permitted only in case of emergency.*

- No person shall be permitted under heavy machinery or equipment while it is being raised or lowered.

Safety Rules—Working on TEL Fluid Lines and Equipment

In order to assure protection of personnel against TEL contamination, the following safety rules must be rigidly observed:

- A member of Operating supervision must be present before work is started. Preparatory steps will have been completed by Operations prior to this time.
- The Maintenance supervisor in charge of the work and a member of Operating supervision must discuss the nature and condition of the equipment to be worked on. At that time a check will be made of the prescribed safety equipment to assure its use. No workman will start until he fully understands the hazards in the work he is about to perform, the possibility of contamination and the counter-measures to be employed.
- Barricades and warning signs must be erected at sufficient distances to assure safety of fellow workers and passers-by.
- Potassium permanganate solution must be present in sufficient quantity to assure adequate coverage of any spills that may occur. Drip pans with the potassium permanganate solution must be placed under each connection to be broken. Potassium permanganate crystals should never be used for decontaminating work, and goggles must be worn at all times when handling the solution or crystals.
- A member of Operation supervision must be present when the first connection is opened.
- When breaking a flange, the practice of first loosening bolts on the side of the flange opposite the position of the workmen will be rigidly observed.
- When contaminated pipe is removed from a system, blind flanges and gaskets in sufficient quantity to close all openings will be provided. Blinds will be bolted in place immediately after opening a flange and remain in place until decontamination is ready to take place or the pipe is ready to be returned to its place in the system.

- Pipe to be permanently removed from a system will be removed from the job site as soon as practicable and taken to the wash pad for decontamination and then to the contaminated pipe disposal area after it has been washed.
- The above rules apply to the removal of process vessels excepting cases where further work is to be performed upon that vessel. In such cases, the vessel will be decontaminated as thoroughly as possible before the additional work is started.
- When work is to be performed upon equipment contaminated with lead sludge, that equipment shall first be removed to the inside of the TEL wash pad if possible and thoroughly covered with potassium permanganate while being cleaned. If the required work is to be performed in the Central Shops, after being cleaned at the wash pad, the equipment will be taken first to the burning area and sufficient heat applied to drive off as much contamination as possible and then taken to the sandblasting area for further cleaning.
- Before cables are changed on a sludge bucket, the bucket must be thoroughly covered with potassium permanganate. Leather gloves, air masks, plastic aprons and overshoes must be worn by the workmen as long as work is in progress. The leather gloves are to be destroyed after replacing the sludge crane cables.
- When inspecting, cleaning or working on the inside of the sludge dryer, only ONE opening is permitted at a time. All men working on the sludge dryer will wear rubber overshoes, air masks, goggles, plastic gloves and plastic aprons, as long as the work is in progress. Caution must be exercised by all workmen to keep free and clean of contaminating material that may inadvertently be allowed to fall on the platform floors. Air hose and tools must be kept clear of this material and, at the completion of the job, be decontaminated at the wash pad.
- Under no condition will anyone work on contaminated equipment on the wash pad without wearing rubber overshoes, air masks, goggles and plastic gloves. A full rubber suit should be worn while cleaning equipment with excessive contaminated dust, such as reflux condensers, etc.
- When breaking into, changing or replacing TEL fluid lines or equipment that is above waist level, a full rubber suit, plastic gloves, air masks and overshoes are required. (Below waist level, an air mask, goggles, plastic gloves, rubber gauntlets, plastic aprons or rubber pants and rubber overshoes will be required when breaking into and working on TEL fluid lines.)

- When breaking into and changing TEL filter bags, an air mask, goggles, rubber gauntlets, plastic gloves, plastic apron, and overshoes shall be worn. When dismantling filter cells at the burning pit and rebuilding cells at the wash pad, rubber pants shall be worn instead of the plastic apron.

Safety Rules for Working Near Molten Lead

Metallic lead melts at 622° F. and it is this high temperature against which workmen must be protected.

Vapors and fumes rising from molten lead are toxic and should be avoided. If, when working with or near exposed molten lead, workmen are exposed to the breathing of lead fumes or dust, a respirator with a metal fume cartridge must be worn.

When it is necessary to open a molten lead line for rodding, replacing with a new section or for other reasons, the following rules must be adhered to:

- All pumps connected with the system to be opened must be tagged out and switches locked.
- Barricades must be erected at a distance sufficiently far from the point of work that people not in protective clothing will not be in danger of spatter or fumes.
- Protective clothing includes a full asbestos suit with gloves attached and must be worn as long as hazards exist.
- Drip pans, sufficiently large to prevent spreading of molten lead, must be put in place prior to opening a line or vessel containing molten lead.
- When it is necessary to open an overhead line or vessel containing molten lead, that work will never be performed with the workmen beneath the point of opening. A ladder or scaffold of sufficient height will be erected to assure the workmen to be at all times above or level with the point of opening.
- The practice of breaking a flange on the side opposite the workmen will be rigidly observed. Never remove all of the bolts from any pipe flange before it has been pried open.

Safety Rules for Working on Lead-Sodium Alloy Lines and Equipment

Lead-sodium alloy melts at 735° F., against which temperature the workman must be protected. Other characteristics of alloy which make it a safety problem are:

- Alloy burns in air when there is a high concentration of sodium or if the mixture is hot.
- Fumes, vapors and dust coming from alloy, whether molten or solid, are toxic.
- Alloy is explosive in the presence of water.
- Ethyl chloride gas is present in the alloy hoppers. Precautions in handling ethyl chloride are covered in another section of this Safety Manual.

Because of these and other hazards, the following safety rules must be strictly observed:

- All pumps connected with the system to be opened must be tagged out and the switches locked.
- Barricade the job site at a distance sufficiently far from the point of work to assure that those persons not in protective clothing will not be in danger of spatter or fumes.

When opening alloy lines:

- Protective clothing includes a full asbestos suit with gloves attached. This must be worn so long as hazardous work exists.
- Ladders or scaffolding of sufficient height will be erected to assure that workmen will at all times be above or level with the point of opening.
- The practice of breaking a flange on the side opposite the workmen will be rigidly observed. Do not remove all the bolts from any flange until it has been pried apart.
- Drip pans sufficiently large to prevent spreading of molten alloy must be put in place prior to opening the line. The bottom of the drip pan must be covered with not less than ½ inch of soda ash.

When opening alloy equipment:

- A respirator with a metal fume cartridge must be worn, if the work required places the workman in a position to inhale fumes and/or dust from alloy, except when welding is being performed, and air mask must be worn.
- Soda ash must be at the job site in sufficient quantity (not less than 100 pounds) to smother any flash and spark fires that may occur.

SECTION 5

Fire Prevention And Protection

OUR BEST MEANS OF FIGHTING FIRE is to prevent one from ever starting. It is therefore imperative that you do everything possible to prevent fires. At times, regardless of all precautions, fires may occur. You should then know exactly what to do so that the fire may be brought under control and extinguished immediately. There is a volunteer fire crew which can be summoned by the Plant fire alarm system.

Learn the locations of the fire alarm boxes and the fire extinguishers, fire blankets and stretcher boxes in your area. Your immediate supervisor will show you how to operate the extinguisher in your area. Also learn how to use the alarm boxes.

When a fire occurs:

- See that an alarm is turned in from the nearest fire alarm box. The person turning in the alarm should stay at the box until help arrives in order to direct the firefighters to the scene of the fire.
- If possible, get the assistance of fellow employees to fight the fire with nearby fire extinguishers until the volunteer firemen arrive.
- A sodium fire is best extinguished by smothering it with dry salt or soda ash.
- If your clothing catches on fire, call for help. *Do not run.* If possible, wrap yourself in a fire blanket or step under an emergency shower. Try to avoid breathing flames or fumes.
- Clothing containing burning sodium should be removed from the body as rapidly as possible.
- When fires or other emergencies occur, it is imperative that congestion due to crowds be avoided. Employees not required for emergency duty in the affected area should leave the area in an orderly manner. Others should remain at work in their respective areas.
- If you have extinguished a fire in your area, report the fact at once to your immediate supervisor if he is not aware of it.
- Always keep fire equipment accessible. Aisleways, passageways, stairways, doorways, and elevator approaches must not be blocked. A blocked fire extinguisher or passageway might result in the loss of life or Plant equipment.
- Keep sprinkler heads clear. Do not pile material closer than 12 inches to these heads.
- *Do not use fire fighting equipment for any other purpose.*
- Allow no piles of combustible refuse or debris to remain in buildings or yard areas where they are a fire hazard.

- Storage of flammable liquids in buildings and laboratories should be avoided wherever possible. Special storage buildings or areas for oils, solvents, paint, etc., are maintained by the Stores, Laboratories and Maintenance. See your immediate supervisor about using these facilities.
- When small quantities of flammable liquids must be kept in buildings and laboratories, approved safety cans bearing Underwriter's labels are to be used.
- Open flammable materials and liquids must never be placed closer than 12 inches to any hot line.
- Waste flammable liquids should not run into sinks or sewers. They should be disposed of in the approved manner.
- No container of flammable liquid should be delivered by anyone for disposal unless the container is properly labeled as to its contents.
- Never use a portable electric tool or spark-producing tool or a non-vaporproof extension light in the presence of flammable vapors or gases.
- When volatile flammable liquids or gases are being transferred, use metal containers and have them all connected to a common grounding system to prevent accumulation of static electricity which would cause a spark.
- Refill motor vehicles at designated stations or from designated equipment only, with motors of vehicles being filled turned off. Avoid spills. If a spill does occur, wash it up with large quantities of water before starting the vehicle.

Flame Permits

The purpose of flame permits is to insure that safe working conditions are provided and maintained while work is in progress.

Always have a flame permit signed by the authorized person or persons in areas requiring permits before starting any work. These permits are printed on standard form and may be obtained from the Supply Room. Observe the following safe practices:

- Employees entering an area to do physical work other than employees making relief on their regular jobs, must report to the immediate supervisor of the area before beginning work.
- Obtain a flame permit from the person or persons authorized to sign flame permits in the area before using an open flame. Portable electric tools and other spark-producing devices are considered open flames unless specifically authorized in an area.
- The person requesting a flame permit is responsible for properly describing the work to be done and outlining any foreseen safety and fire hazards.

- The person authorizing a flame permit is responsible for:

  The condition of the area or equipment to be worked on. He must assure himself that it is safe to use an "open flame."

  Seeing that adequate safety and fire protective measures have been taken.

  Seeing that adequate fire fighting equipment is available.

- Authorized flame permits must be kept on the job site and be available all the time the job is in progress.
- When a job is interrupted, at other than the noon hour or rest periods, or when it is completed, the flame permit must be returned to the originator.
- If the work is not completed at quitting time, the workman on the job must notify the immediate supervisor. Permits left in the Shift Supervisor's office at time of shift change must be checked by the Shift Supervisor to determine the status of the job.
- Flame permits must be immediately cancelled by the supervision if the area becomes unsafe to work in.

Smoking

Smoking is a major cause of fatal and destructive fires. In chemical plants there are unusual fire hazards. For this reason it is imperative that all employees adhere strictly to the Plant smoking regulations. Areas where smoking may be safely enjoyed are provided at convenient locations throughout the Plant, such as in lunch

rooms, smoking corrals and in most office buildings. In order to protect yourself and others, the Plant smoking regulations must be followed. Consult your immediate supervisor regarding the smoking rules in your area.

- Matches or lighters must not be brought into or carried on the Plant. These are provided at locations approved for smoking.
- Carelessness in discarding matches or cigarettes may cause fires. See that your matches and smokes are completely extinguished before they are discarded.
- If you wish to enjoy continued smoking privileges in the Plant, do not violate the smoking regulations.

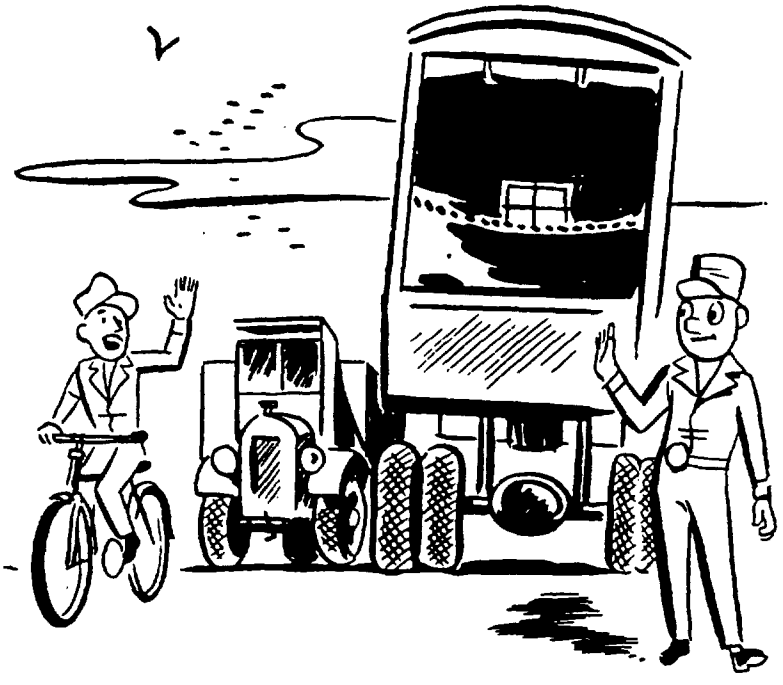
SECTION 6

Office Hazards

THE SAFE OFFICE WORKER will watch for the following hazards and avoid or correct them whenever they occur:

- Desk drawers, file cabinets and doors on storage cabinets should not be left open.
- Tipping back in straight chairs is unsafe. Serious injury may result if you lose your balance.
- Female employees should avoid straining at tight windows and lifting or carrying heavy objects. Such practices may result in injuries or strains.
- Piling objects on desks, file cases, bookcases, window sills and tables is poor houskeeping. Keep your office furniture tidy so the janitors can dust and clean properly.
- Use extreme care when handling knives or shears. They can cause serious injuries. It is inviting injury to place open knives and blades in desk and file drawers.
- Carelessness in discarding matches or cigarettes in waste paper baskets may cause fires. Use an ash tray and see that your matches and smokes are extinguished before they are discarded.
- Running on stairs and in aisleways is prohibited. When using stairs, use the handrail. Blind corners and doors should be approached cautiously. Keep on the right side.

- Pencils, pens, scissors, etc., should be handled so that the sharp points cannot cause an injury. Never carry a pen or pencil in the mouth. When carrying pencils in the pocket, the point should be down. A pen or pencil makes an excellent floor roller. Pick them up before someone slips and falls.
- Punctures and scratches are caused by pins used to fasten papers together. Use paper clips or staples. Careless handling of paper can cause painful cuts.
- Defective office furniture is hazardous. Report it at once to your immediate supervisor.
- Cords on electrical equipment and telephones must be maintained in good condition and protected from mechanical damage. Defective and worn cords must be replaced. Report them to your immediate supervisor. Cords must not be run on the floor across aisles as they constitute a tripping hazard.
- Do not tamper with or attempt to repair electrical equipment.
- Keep electric fans off desks and file cabinets. Fans on the floor must be properly guarded.
- Broken glass, sharp metal, wood splinters, etc., should not be placed where they can cause injury to yourself or to the janitors. See that such hazardous material is immediately cleaned up.



SECTION 7

Vehicles and Pedestrians

EXTREME CARE MUST BE exercised by pedestrians and vehicle operators on plant roads. *Each employee must be alert for the safety of others as well as himself.* Our traffic safety regulations are:

- The speed limit on the Plant for all vehicles is 15 miles per hour. In some congested areas, it is less. Watch for signs.
- Watch for automobile, fork lift truck, truck and railroad traffic when using Plant roads.
- Pedestrians walking on Plant roadways should walk on the left-hand side of the road unless there are established walkways. Use the walkways wherever possible.
- The automobile parking lot is for your convenience. Cooperate with the Plant patrolman stationed there. He is there for your safety.
- Do not take "short cuts" through buildings, shops or work areas. Use the regular roads and walkways.
- Vehicle drivers should sound their horns when approaching intersections, building doorways and blind corners.
- Only authorized employees are permitted to ride on freight cars or locomotives being moved in the Plant.
- It is potential suicide to climb through, over, under, or between railroad cars. Employees are forbidden to do so. They must wait until the train passes.
- Plant vehicle traffic must obey all railroad crossing signs. Most crossings require the vehicle to slow down before proceeding; some at blind crossings require the vehicle to stop. Obey the signs. They are for your protection.
- Employees riding in the body of Company trucks must sit facing the rear of the truck. Standing or sitting on the sides is prohibited. No more than three persons are permitted to ride in the cabs of Company trucks.
- Employees are not permitted to ride on running boards of Company automobiles or trucks.
- Plant employees are not permitted to operate Company-owned automobiles or trucks until they are trained and are authorized.
- It is unsafe to sit in the cab of a truck being loaded by a crane or power shovel. Leave the cab until the loading operation is completed.
- Vehicles should not be started until every occupant is properly seated. Do not step from a vehicle while it is in motion. Wait until it stops.

- Trucks with the rear view obstructed must not be operated in reverse until a watcher is stationed at the rear of the truck to warn pedestrians and direct the driver.

Bicycles

- Ride bicycles on the right side of road, with traffic.
- Remain seated. Never stand on pedals to pump.
- Observe all traffic signs and signals.
- Do not ride on sidewalks or paths.
- Look out for pedestrians.
- Do not ride faster than 15 miles per hour.
- Do not carry material that would prevent the use of both hands on handlebars.
- Do not carry glassware, sample bottles, etc., unless bicycle is equipped with special facilities to prevent breakage.
- Only one person is allowed on a bicycle.

Motor Scooters

- Motor scooters are to be used only by trained and authorized personnel.
- When starting a motor scooter, keep throttle in low position, stand on left side and use right foot to press starter pedal down.
- Never leave a motor scooter parked with motor running.
- Ride to extreme right side of roads and streets. Ride in a straight line and be continually alert for other traffic.
- In riding in company with others, ride in single file.
- Keep the mechanism (chain, spokes, tires, light, etc.) in good condition; check the brakes frequently and have repairs and adjustments made when necessary. Have white light on front and reflector or red light on rear for night riding.
- Observe all traffic signs and signals.
- Do not park motor scooters across doorways, in halls or on the roads or other restricted areas.
- Use hand signals when slowing down, stopping or preparing to turn. Otherwise keep both hands on the handlebars.
- Don't hitch onto a moving vehicle.
- Do not carry passengers on motor scooter or its tool box.
- Be considerate of all motorists and protect the pedestrian; remember, he always has the right-of-way.
- Fast riding is always dangerous, especially on rough surfaces.
- Don't try to be an acrobat while riding a motor scooter.

- Keep feet on foot rest while riding.
- Apply brakes in such a manner that the rear wheel will not skid.
- Do not carry material that would prevent the use of both hands on the handlebars or which protrudes to the front or rear.
- Do not carry glassware, sample bottles, etc., unless motor scooter is equipped with special facilities to prevent breakage.
- Do not ride on sidewalks or dirt paths.
- Be extremely cautious when riding in loose gravel.
- Observe Plant area speed limits.
- When passing a parked car, always be on the alert for the opening of car doors. Do not pass vehicles moving away from curb.
- Slow down at intersections and look in both directions before crossing.

SECTION 8

Maintenance

General Rules for Painters

- It is the duty of the immediate supervisor to properly line up the job with supervision and to keep the operating area or building supervisor advised daily on progress of the work.
- No painter will do any work in the area without the knowledge and permission of the person in charge of the area.
- Be sure that the safety hazards and rules covering the job are discussed and understood by all persons concerned prior to starting work.
- Protective equipment must be supplied and used as required.
- Restricted areas or enclosures are not to be worked in without the knowledge and approval of the operating area or building supervisor.
- Be careful of footing. Never walk on transite or other surfaces suspected of being incapable of bearing the weight of person.

Cleaning Lines or Equipment

- Prior to cleaning lines containing flammable liquids or gases, the hazards of the job must be discussed with the operating area supervisor and the recommended precautions followed.
- Nonsparking scrapers, chisels and chipping hammers must be used when working on such lines or equipment. Sparks of ignition temperature can be caused by striking aluminum painted surfaces with nonsparking tools.
- If, while cleaning a line, a leak develops from any cause, work is to be stopped immediately and the operating area supervisor notified. Work is not to be resumed until the leaky line has been repaired and permission been granted to continue work.
- Spray painting is not permitted in areas in which ignition sources prevail.
- Do not remove or change the position of ground wires on lines or equipment. If they must be disconnected, notify the supervisor and he will have the wire disconnected.
- Never clean or paint energized electrical equipment, regardless of voltage, unless you have the proper permission.
- Never paint a sprinkler head. Paint cuts down the sensitivity of the bulb or link and retards its action in case of fire.
- Do not store paint cans, whether covered or not, in any building except approved storage areas.
- "Varsol" and other similar solvents are not to be used for cleaning soiled paint in any building or confined area not well ventilated or free from sources of ignition.
- Do not use paint thinner for cleaning soiled paint.
- Red lead must not be sprayed.

Equipment

- When handling ladders or scaffolds, work according to the rules governing this type of equipment. Place them on a firm foundation.
- Swinging scaffolds and "bosun" chairs are to be inspected before use. This equipment is periodically tested.
- A hard hat is to be worn at all times.
- Safety belts must be worn as specified in the Maintenance safety rules.

Personal Safety Equipment

- Goggles are to be worn whenever necessary to protect your eyes. Be sure they fit, and clean them frequently.
- Clothing must be in good condition. Collars should be buttoned and sleeves down.
- Leather or plastic-coated gloves must be worn when working in the TEL area.
- Safety shoes are recommended for wear at all times.
- Air mask must be worn whenever there is danger of breathing contaminated air. Get mask and air hose from the Tool Room and return them when you are through.
- A paint respirator and goggles must be worn whenever chipping. Respirator must be worn when spray painting.
- Protective cream is available for use on face and neck if necessary.
- When brush-treating lumber with creosote, coat the face and neck with Vaseline before starting work, to prevent burning.
- If contaminated material gets on clothing, immediately follow procedure described in the General Rules of this booklet.

Safety Rules for Handling Mobile Equipment, Freight and Raw Material and Excavations

Operation of Trucks and Tractors

- The driver is responsible for the safety of persons being transported as well as seeing that equipment is safely loaded and carried. Do not operate defective equipment.
- The speed limit is 15 miles per hour except in restricted areas, which are plainly marked.

- Parking equipment or piling material is not permitted within 20 feet of fire hydrants, hose boxes, sectional control or P.I. valves.
- Turn corners with care and drive with extreme care in areas where fork lift trucks are operating, or in other congested areas.
- When loading or unloading material, be sure it is handled in a safe manner. Use skids where necessary.
- When collecting trash, never pack it in the truck with your hands. Be careful to keep glass segregated in a separate container.
- Only two men will be allowed to ride in the cab on a dump truck. No one is allowed to ride in the back of the truck.

Excavations

- All ditches and trenches shall be sloped sufficiently according to the character of the soil or material, to prevent slides.
- When sloping is not possible, shoring shall be used in all excavations wherever the vertical dimension exceeds 4 feet, and less than 4 feet if the character of the soil or situation warrants it.
- Excavations or other work which result in creating a hazard to other employees must be barricaded (see Barricades).
- Before excavation work is begun, permission must be obtained from the area supervision involved.
- All materials used for shoring shall be straight-grain timbers.
- Tools and equipment must be properly stored, kept in good condition, and not used when defective.
- Concrete breakers, "air hammers" and "dirt tampers" must be grounded while in use.
- Do not attempt to do any job with which you are not familiar until you have discussed it with your immediate supervisor.

Safety Rules for Working on Top of Tanks

Working on top of a tank can be dangerous since the thickness of the metal plates forming the top cannot be determined without checking the bottom side. Therefore, the rules listed below are to be followed when working on top of a tank:

- A board or boards will be placed on top of a vertical tank when work is to be performed. Employees will perform the necessary work while standing on the boards except where the work can be performed from a permanent walkway.

- A board in length equal to at least one-half the radius of the tank is required on any vertical tank. Two or more boards must be used on tanks with a radius of more than 8 feet.
- A special hinged type board will be used on curved or dome-like tops whenever possible.
- On two or more adjacent tanks in a horizontal position, a board may be placed from one tank to another, providing the board extends at least 12 inches past the center of each tank.
- A scaffold will be constructed from which to perform work over a single tank in a horizontal position.

Hose

- Hose must be used only in the service for which it is designated and must always be equipped with approved type fittings. Hose or other lines, such as electrical cable, must be supported at a height of at least 6½ feet over all passageways or working areas.

Compressed Air

- DO NOT APPLY COMPRESSED AIR OR GAS TO ANY PART OF THE BODY OR CLOTHING.

- Kinds of fittings and their use:
  Thor for nitrogen.
  Dix-lock for compressed air.
  Chicago for water.
  Boss for steam.
  A tail hose with lubricator will be used at air tool connection.

Testing

- The testing for leaks in any equipment with gas or air shall be done after the equipment has successfully withstood an adequate hydrostatic test. Any deviation from this rule must be given the approval of Operating and Maintenance supervisors.
- All pressure testing shall be witnessed and approved by the Inspection group.

Welding or Burning

- Only authorized persons are permitted to use welding or burning equipment.
- When electric welding, the ground cable from the D-C generator shall be connected directly to the work on which welding is being done. Goggles must be worn at all times whenever connecting or disconnecting the ground cable.

Flame Permit

- Before any welding, burning or other type of flame is used in the areas where permanent flame permits have not been established, a flame permit must be obtained before any work of that nature can be started.

Oxygen and Acetylene Equipment

- The cylinders must be kept at least 25 feet from any exposed flame except where approved storages are installed. Oxygen and acetylene bottles must always be in a storage rack or buggy.
- Before any new piping is installed on a manifold, the piping must be acidized to remove all oil.
- Oil or grease must not be used on any part of the equipment.
- Cylinders are not to be taken into any operating buildings without special permission. Special permission will be obtained from the Operating supervisor of the area.
- A 4-pound Ansul extinguisher must be carried on all welding equipment carts.

Electrical

- Electrical equipment or ground wires to this equipment must not be tampered with or repaired by anyone other than authorized personnel.
- No electrical connection on underground pipe lines shall be disconnected by other than authorized personnel. Also no underground pipe line shall be disconnected unless it is satisfactorily bonded.

- Whenever there is any "hot electrical work" to be performed, permission must be secured from the Maintenance superintendent before such work is started.
- Whenever work is done on portable electrical equipment, the equipment must be checked by an electrical foreman before it is returned to the Tool Room.
- Whenever it becomes necessary to work on electrical circuits, the circuit must be entirely disconnected before work is started, unless permission as outlined in "C" is granted. The use of 2-pole switches to disconnect 3-wire systems is not sufficient. Individual branch circuits may be worked on by disconnecting the single snap switch in the lighting panel only and pulling the fuse, provided the work to be done is beyond the switch. If the work on the branch circuit involves the snap switch itself, or for any reason the branch circuit is considered hazardous, the 3-pole service entrance switch must be de-energized.

Electric Welding Machines

- Only authorized electricians are permitted to hook up and determine the rotation of electrical welding machines. After a machine has been started and checked by the electrician, then authorized mechanics are permitted to start, stop, and make any welding current adjustments necessary.
- Only authorized mechanics will be permitted to use or handle the welding leads or clamps while the welding machine is running.

Electrical Equipment Painting

- The superintendent of Maintenance or supervisor of Maintenance should be contacted regarding equipment of a questionable nature.
- Whenever paving breakers are used for breaking out concrete, a flexible ground connection must be fastened from the frame of the concrete breaker to a suitable and accessible permanent connection.
- Before changing any lamps, the circuit must be de-energized and goggles worn.

Electrostatic Grounding

- Must be installed, where required, by an authorized person.
- All ground wires must be removed and replaced by authorized personnel.
- Electrostatic grounding on equipment, lines and building steel will be inspected periodically.

Digging Permits

- No digging is permitted in the TEL area unless a permit, signed by the Operating supervisor or his designated alternate, is obtained.

Safety Rules for Broad Gauge Railroad

- No one except those whose duties require it shall be permitted to ride on trackmobile or cars.
- Going between or in front of moving trackmobile or cars to couple or uncouple, connect or disconnect hose is prohibited.
- Be certain that all personnel are clear before signaling to move train.
- Look in both directions before stepping between cars.
- Use lever to couple and uncouple. If lever is inoperable, have proper understanding as to signals to engineer before using other methods. Know and use standard signals.
- Using foot or hand to set draw-bar, knuckle or lock pin while cars or trackmobile are in motion or about to come together is prohibited.

- Standing on track in front of an approaching trackmobile or cars for purposes of boarding same is prohibited.
- It is prohibited to ride on front of trackmobile in direction of travel.

- Be on the alert for "close clearance" along the right-of-way and report any which you consider dangerous.
- Cars should be spotted as far from roads as possible. Never spot a car so that it extends beyond designated stripe unless cleared by proper supervision.
- Trains or cars should not cross any road without reducing speed, ringing bell, and whistling. A crew man should ride the front end of the cars being pushed across roads, or flag the crossing. Flag all blind crossings.
- Guards must not be removed from any part of the trackmobile except for repairs.
- Before tank cars are coupled, a check must be made to see that all lines are disconnected. Also, check electrostatic ground wires to insure their being removed. If they are not removed, notify Operations and do not move car until lines and/or electrostatic wires are removed by Operations.
- Before the engine (with or without cars) is moved, the proper signal must be given by a member of the crew. Upon completion, a crew man must be on the head end of train before leaving area. Head end means direction of travel. During these operations, cars may be moved the distance necessary to clear the scales or to insure the coupling is made.
- The "Kicking" of cars by the trackmobile is *prohibited.*
- All doors on loaded boxcars must be latched, load-braced, or blocked before the cars are moved except for lead ramp movement, spotting lead cars at ramp.
- An engine must never use the live rails to cross over the track scales. Cars that have passed the switch at end of scale must be moved only over dead rail. The unnecessary movement of cars over live rail is prohibited.
- Keep all area switches closed when working in area.
- When operating ball switch, keep hands and feet in position where they will not be caught by lever or ball.
- To avoid derailments, make certain that latch has caught switch lever before leaving switch.
- Flying or drop switching is *strictly prohibited.*
- When necesary to go outside gates, a Plant guard will open and close gates.
- All hazards are to be reported to your immediate supervisor promptly and adequately marked until corrected.
- Walk outside of tracks, where there will be no danger of being struck by moving train; never walk between rails.

- Never cross tracks ahead of approaching cars or engine without exercising proper caution.
- Always have adequate control at all times for proper braking.
- Do not remove any appliance of the trackmobile or car for convenience in switching which would endanger the safety of any personnel.
- Never sit in front of trackmobile even when it is not in operation.
- The switching crew is prohibited from removing "blue-spots" or derails.
- Do not operate any switch that has a Danger Tag placed on it and obey all instructions on a Caution Tag.
- The trackmobile must be operated at a speed consistent with good sound judgment, depending on location and existing conditions.
- Check engine thoroughly at the beginning of each shift as outlined in the Operating Manual.
- Warn all personnel working in the area before starting the movement of cars.
- Use caution and good judgment in starting and stopping trains to avoid sudden movement, which might cause damage to property or injure personnel. Always blow whistle before starting.
- Operator is to bring train to a stop when in doubt as to safe operating conditions, such as railroad safety or clearance, or when a hand or lantern signal is not clear.
- When coupling onto cars, always pull train to insure fast coupling before pushing with engine. When weighing cars, it will not be necessary to pull each car, but speed shall not exceed 3 miles per hour.
- Driver should stop train when helper is not visible.
- Use sand on rails when damp or wet, except on scales, to assist in stopping or starting trains.
- Cars must be spotted at least one car length behind derails.
- Do not step on rails.
- Face locomotive or car when getting on or off of standing or moving car.
- The scale switches must be lined for the dead rail track except when cars are being weighed.
- Cars must not be allowed to stand on the scale except when being weighed.
- Cars must not be stopped suddenly on the live rails of scale by impact, sudden application of brakes or by chucking the wheels.

Safety Rules Pertaining to Air Masks and Equipment

Air Masks and Equipment

- All air mask hoses will be fitted with Schrader male and female hose fittings. The female half of a Schrader fitting is an automatic valve. This will enable the personnel to seal the hose, and in this way the hose can be washed and decontaminated without danger of getting anything in the hose.
- The air mask will be fitted with a male half of Schrader coupling. Leave petcock for air flow regulation.
- Air masks, type MSA E-46891-7 will be used.

Safety Rules for Working on Lines, Fittings and Equipment Containing Metallic Sodium

Metallic sodium melts at 98°C. Sodium's most notable and dangerous characteristic is its violent reaction with water, liberating hydrogen which explodes from the heat of the reaction.

Limited moisture in the atmosphere unites with sodium to form a strong caustic solution which irritates and burns the human skin.

The following safety rules are designed to protect the workmen against these and other hazards, and must be observed.

Sodium Lines — Sodium Storage Area

- Permission from the Operating section must be obtained before work of any nature is started on any equipment or piping containing metallic sodium.
- The nature and condition of the equipment, and the proper method of procedure, must be discussed with the person giving permission to begin the actual work. No work shall be started until the workmen fully understand the hazards of metallic sodium and the status of the equipment with respect to draining, temperature, purging or other safety measures.
- Preparatory measures will be carried out before equipment is worked on.
- The area adjacent to and below must be roped off and adequately marked with the proper warning signs.

- Before actual work is started, dry soda ash and sufficient pans must be provided to take care of any sodium spills. A member of Operation supervision must be present when the first flange is loosened.
- Flanges should always be broken in a cautious manner and away from the workmen. Individuals performing the job should always assume the line is full until the work is completed.
- Goggles, head cover, moleskin mitts and apron, face towel and spats must be worn at all times while breaking into any line, valve or piece of equipment which contains metallic sodium.
- Sparks and fires that occur when opening sodium lines or equipment must be smothered immediately with the proper smothering agent (soda ash).
- After the section of line or equipment has been removed, it, as well as the section of line from which it was removed, should be blanked-off with wooden plugs and given to the proper group so the sodium can be removed and burned.

Safety Rules for Operating Pitch Melt Pot

General

- Wear acid type goggles.
- Wear gloves.
- Check with foreman if any trouble is encountered.
- Turn off when finished or when unattended.

Lighting of Pot

1. Turn on exhaust fan.
2. Turn off all fuel valves.
3. Turn thermostat to "Off".
4. Turn on main fuel valve and also pilot burner valve.
5. Insert lighted torch in lighting well.
6. Press red button until pilot burner is ignited. Hold down for approximately 30 seconds. Repeat Step 5 if pilot burner goes out.

Operating of Pot

1. Set thermostat to 150° until pitch has melted, and then set thermostat to desired temperature.
2. Fill only to one-half of capacity.

3. Keep cover closed.
4. Keep container under spigot.

Shutting Off Pot

1. Close off main fuel valve.
2. Turn off exhaust fan.

Safety Rules for the Use, Care and Installation of Grinding Wheels and the Operation of Portable and Stationary Grinding Machines

Grinding Wheels

1. Before installing a grinding wheel:
   (a) Be sure the design speed as marked on the wheel is equal to or in excess of the maximum speed of the machine.
   (b) Check arbor hole for correct size.
      (1) Wheel should slip onto arbor easily but not have excessive play.
   (c) Check wheel for damage.
      (1) Visual check for cracks, chips, uneven surface, condition of bushings, etc.
      (2) Ring test:
         (a) Suspend wheel with pin through arbor hole, tap wheel gently with a small wooden hammer. A true ring will come from a good wheel.
2. Have blotters on wheel where Perk washers are not used.
3. Wheels must not be stored any place other than in Stores or in the tool rooms.
4. When changing a wheel in the field, do not place wheels where other items can be put on them.
5. Do not drop, or bump. If dropped, discard the wheel.
6. Do not roll wheels (hoop fashion).
7. Run new wheels at full speed for approximately one minute before applying work—operator stand to one side.
8. Feed work against cold wheel lightly so that wheel will warm slowly.
9. Do not grind on the side of a straight face wheel.
10. Only trained personnel will be allowed to service stationary grinders and true-up a wheel.
11. Back and front flanges must be the same O.D.
12. The face of the flanges must be true.
13. Tighten spindle only enough to hold wheel firmly.

14. All surfaces of wheels and flanges must be free of foreign material.
15. Use wheels only for the purpose for which they were designed —grinding.
16. Wheels are inspected weekly but must be visually checked by each user before being used.
17. Discard wheels that are worn past two-thirds of normal size on stationary grinding machines because the heat generated will destroy the bonding.
18. Grind nonferrous metals and wood with designated wheels only.
19. Remove and destroy unbalanced wheels.
20. Do not push work hard into wheel to stop machine.

Grinding Machines

1. *Portable*
   a. Check monthly for faulty operation and overspeed.
      (1) RPM not to exceed design speed as stenciled on the machine.
   b. Do not drop.
   c. Make sure spindle is not too short or too long for threaded cones or wheels. A spindle too long will crack cones above spindle hole or stick through wheels too far. A spindle too short will not allow enough threads to screw into the arbor hole.
   d. Make sure spindle is threaded down far enough so that there is no space between spindle flange and cone or wheel.
      (1) Do not attempt to correct c. or d. above in the field. Return tool to tool room.
   e. Do not use a threaded cone or wheel with a relieved flange.
   f. The proper type guard must be used at all times. Maximum angular of wheel exposure for flat face and cone type wheels is not to exceed 180°. Maximum distance between the edge of the guard and the face of a cup wheel is ½ inch.
   g. Hold machine away from work, turn on and let run for approximately one minute before starting to grind.
   h. Wheels cannot be changed by any mechanic unless he has been properly instructed and a record of such instructions filed.

Stationary
   a. Check weekly:
      1. Wheels
      2. Shields
      3. Guards

4. Tool rests
5. Lights
6. Anchor bolts
7. Switch

b. Use correct size wheel, maximum O.D. determined by hoods on grinders.
c. Let run approximately one minute before starting to grind; operator stand to one side. This allows wheel to warm up and if wheel breaks, the operator is in the clear.
d. Feed work into wheel lightly to start, so wheel will warm slowly.
e. Turn off machine when through grinding.
f. Have tool rest within ⅛ inch of wheel.
g. Have area around grinding machine clear.
h. Check spindle for wear when wheel is changed.
i. Do not use grinder without Perk washers and unless the seven items in (a) above are in good condition.
j. Do not use the side of the wheels.

Carpenter Shop

The following rules supplement the Plant and Shop general safety rules and should be followed along with the others.

On woodworking machinery, the variety of operations, the high speed and sharpness of the cutting tools, and the comparative light weight of wood, combine to produce high accident rates. The following rules, if followed, will eliminate accidents and prevent injury:

- Only authorized employees are permitted to operate woodworking machinery, except under the direct supervision of the supervisor.
- A dull saw is dangerous. Keep saws in first-class condition.
- A rip saw shall not be used for cross-cutting nor shall a cross-cut saw be used for ripping.
- High speed saws should be checked frequently for the following:

  Tension, back thrust, twist, kinks, bent teeth and proper alignment.

  Saws must be sharp, not cracked, and properly mounted. Check planer, shaper, and jointer knives, nuts and clamps. Guards must be in place and used on all machinery which is being operated.

  Never feed material faster than saw will take it.

  Be sure saw is set at proper height to cut through the wood.

- Stand out of line to avoid possible kick-back when ripping.
- Employees "ripping" rough lumber should wear gloves to protect the hands. Gloves must *not* be worn when using the band saw, jointer or lathe.
- Never change the gauge while machine is running.
- Always use a brush to remove dust or particles or scrap wood from the saw table or the work bench, but never brush saw tables when saws are in operation. Never use compressed air to clean equipment or floor except in extreme cases. This is to be decided by the supervisor, and will be done even then only if equipment is shut down and goggles are worn.
- Do not allow material to accumulate on the saw table. Keep the floor clean at all times.

- Machine must be brought to a dead stop before the operator leaves it.
- When stopping equipment, do so by "braking" it with a piece of wood. Never stop equipment too quickly, and be sure it is stopped before you leave it.
- Goggles must be worn whenever the nature of the work requires their use.
- When using equipment to shape small pieces, use a jig and keep fingers away from knives or saws.
- Do not remove guards from equipment.
- Equipment must be shut down and switch tagged out for oiling, unless oil cups are located outside the guard.

- Wear tight fitting garments. Keep sleeves down and buttoned at the wrist.
- Lumber in storage should be neatly piled with "fire breaks" between tiers.
- Finished material should be stored near the outside door to prevent congestion in the shop.
- Always use a push stick on short or narrow pieces.
- Never reach over saw to obtain material from the other side.
- Do not attempt to sharpen a saw unless you are qualified.

Machine Shop

- Never wear gloves when working on a machine which has rotating or moving parts.
- When using a grinder, keep the grinder shield in place and wear goggles.
- Never use compressed air or your hand to remove chips from a machine. Instead use a brush, stick or piece of metal.
- Oil on the floor is dangerous. Wipe it up immediately.
- Never wear jewelry in the Machine Shop. Rings have caused the loss of many a finger.
- Wearing thin-soled shoes can be dangerous.
- Closet doors and bench drawers left open may cause injury. Keep them closed when not in use.
- Never attempt to make electrical repairs yourself to your machine. Report the trouble to your immediate supervisor.
- Before you move a lever or push a button on any machine, be sure you know what is going to happen.
- Do not remove guards from the machine unless instructed to do so. Be sure they are in place before starting machine.

Chain Hoists

- Do not use any chain fall from the tool room that is tagged "caution."
- Never use a chain fall on more than its rated load; that is, use ½-ton hoist for ½-ton load or below.
- When installing a chain fall, always use a hand line or safety line to raise or lower into position wherever possible.
- Use beam clamps to hang falls wherever possible and mouse hooks. In the event cable slings have to be used, cushion the sling against all structural steel or sharp edges.

- Be certain that the hand wheel is not fouled after the chain fall is installed.
- Do not overload the chain fall by having too many men pull the hand chain. On ½-ton and 1-ton chain falls, use only one man on the hand chain; on 2-ton falls, never use more than two men; on 3-ton and above, never use more than three men.
- Never wrap the load chain around any equipment for lifting purposes. The load hook is attached to the chain with a self-centering link to prevent the chain from twisting or binding against the sheave.
- Never insert the hook into a hole or under a flat edge for lifting. The hook is designed to bend, not to break, and any load that acts on the hook point and not at the bottom of the hook will straighten it out. Wherever two cable lift eyes are needed, shackle them together and lift the load with the hook through the shackle.
- Never use a faulty chain fall. If chain links are distorted, hook bent or sprung or the chain fall is binding or slipping, etc., report this to your immediate supervisor immediately.
- Return chain falls to loft as soon as job is finished.

Working from a Boatswain's Chair Suspended from a Mobile Crane Boom

- Before an employee performs work from a boatswain's chair suspended from the boom of a mobile crane, it is necessary to obtain approval of the Maintenance supervisor or the Operations Area supervisor.
- The blocks and rigging must be attached to the crane boom, not the load hook, with the boom in a lowered position. Double blocks only must be used.
- The crane boom, with the blocks attached, must be raised to the desired position.
- The chair block must be lowered to ground level to attach the boatswain's chair. IMPORTANT: Under no circumstances shall an employee ride in the boatswain's chair while being raised with crane boom.
- After a final check on the rigging, the crane engine must be stopped and the brakes set.

- A Danger Tag must be placed over the crane starter switch to prevent starting the engine or operating the crane while the boatswain's chair is in use.
- All safety rules pertaining to the use of a boatswain's chair must be adhered to during the performance of the work.

Use of Boatswain's Chair

- All rope, wire or hemp for use with a boatswain's chair must be inspected for defects **BEFORE EACH JOB.** Rope with splices must not be used.
- All rope must be tested before each use to be equal to twice the employee's weight.
- Wire rope only must be used in acid areas.
- A safety belt tied to the chair block must be used by the employee at all times in the performance of the work.
- The upper block must be properly secured to the supporting member. Double blocks only must be used. When working in a boatswain's chair from a stack, the supporting ring at the top of the stack must be inspected before attaching the block.
- The hook on the upper block must be properly moused. The chair cable on the lower chair block must be secured with heavy copper wire through the block and chair eyes, in order to leave the hook exposed.
- When an additional employee is used to assist in raising or lowering the chair from the ground, the additional employee must secure the hoist line with a wrap around a structural support.
- When an employee raises or lowers himself in a boatswain's chair, he must secure the hoist line to the lower block hook.
- Boatswain's chairs must not be used when winds are high.
- A tag line should be used and the chair should be securely lashed to a stationary member at the work point when the type of job being performed warrants such.

Safety Rules for Pouring Sockets on Wire Rope

Only authorized persons are permitted to pour sockets.

- Wire rope preparation:
  1. Wear gloves when working with wire rope.
  2. Have socket end of wire rope properly cleaned.

- Socket preparation:
  1. Have socket free of dirt.
  2. Check socket for damage.
- Pouring of socket:
  1. Have wire rope properly placed in socket.
  2. Socket must be dry.
  3. Safety:
     a. Wear gloves.
     b. Do not stand too close to socket while pouring.
     c. Wear goggles.
     d. Wear respirator.
        (1) MSA Comfo Twin Filter type.
            (a) MSA Comfo metal fume filter.
     e. Keep cleaning acid in proper container.
     f. Secure acid contained to prevent spilling.

Mobile Cranes and Winch Truck

- This crane shall be operated only by experienced operators or only under the direct supervision of an experienced operator.
- No one shall operate this crane unless he understands and is familiar with the proper hand signals.
- The operator, when handling material with his crane, shall devote his entire attention to his work.
- The operator shall recognize signals only from the person who is supervising the lift or from an authorized signal man.
- The workman shall see that the load is well secured and properly balanced in the sling before it is lifted more than a few inches off the ground. When the crane operator cannot see the equipment to be lifted, the signals are to be transmitted by the person supervising the lift.
- Care shall be taken to see that ropes which lift the load are not kinked or twisted and that padding is placed on sharp edges when necessary.
- Before starting to hoist, bring the hoisting ropes to a vertical position and centered over the load.
- Sudden starts and stops shall be avoided.
- Operator must avoid carrying loads over people and must permit no one to ride the load or the hook.
- No load of any kind is to be suspended for any considerable time.
- Crane shall not be loaded beyond the safe working limit.

- The operator shall test the brakes each time when approaching rated load before he makes final pick-up.
- Hoisting rope clamps and all bolts shall be kept tight.
- Crane cab shall be kept clean and free from loose material. Tools, oil cans, waste, etc., should be kept in a metal box and not allowed to lie loose in the cab.
- Slings and ropes shall be kept neatly coiled and stored clear of moving parts.
- A fire extinguisher shall be installed on the crane and ready for use at all times.
- Cables should not be under "load" when crane is stored or not in use.
- Before leaving crane, the operator shall place all controls in the "Off" position.
- A tag line must be kept with each crane and used on all loads.
- Place red flags on overlength or protruding equipment carried by crane.
- Crane boom shall not be used for side pulls.
- Operator shall see that boom will clear overhead objects.

Winch Truck

- Winch truck operator must be experienced and an authorized operator.
- No person shall operate winch unless he understands the signs and signals for hoisting equipment.
- Workmen shall see that load is well secured before lifting.
- Workmen shall see that hoisting rope is free of kinks or twists.
- Mechanics shall see that load is properly balanced, that hoisting rope has been protected by padding, when needed, on sharp edges, and that the load is well secured before starting truck.
- Operator shall see that everything is clear (overhead pipe lines, pipe supports, welder's cables).
- No rope shall be handled on winch head without the knowledge of the driver of the truck.
- The cab of the winch truck must be clear of all loose material.
- Fire extinguisher shall be ready for use at all times.
- Tag line must be kept with winch trucks.
- Place red flag on overlength or protruding material carried by winch trucks.
- Only two men will be allowed to ride in cab.

SECTION 9

Operations

A. TEL AREA

1. Ethylation and Distillation

- No horseplay.
- Air or gas masks must be worn whenever tetraethyl lead or ethyl chloride fumes may be present. These masks are to be worn on such routine jobs as:

  Cleaning up tetraethyl lead or ethyl chloride.
  Cleaning angle valve seats.
  Rodding out plugged hoppers.
  Testing for small leaks.
  Whenever any line or vessel containing tetraethyl lead or ethyl chloride is opened for repairs or cleaning.

- Goggles must be worn *whenever eye protection is necessary.* When in doubt, consult your supervisor. They must be worn on the following jobs:

  On any job requiring an air mask.
  When handling sulfuryl chloride, tri-sodium phosphate or soda ash, or potassium permanganate.
  When working through a still manhole.

When handling any acid or caustic.
When taking or carrying samples.
When striking metal against metal.
When inspecting overhead pipelines or operating overhead valves or equipment.

- All spills and leaks which may contain tetraethyl lead must be treated with saturated (approximately 5%) potassium permanganate solution (or 5% sulfuryl chloride solution) and then washed with water. Check your supervisor as to which decontaminant to use. Sulfuryl chloride is made up in a 5% solution and stored in a glass jug outside each building. *Do not use "crystal" permanganate on pure TEL. Do not use the strong 100% sulfuryl chloride which is stored in a steel drum. Either might cause a fire.*
- A member of Operations supervision must be present when any line, pump or vessel containing tetraethyl lead is opened. The exceptions to this rule are:
  Cleaning sight glasses.
  Cleaning angle valve seats.
  Opening still manholes.
  Daily or routine cleanup of building tanks.
- Waste material containing tetraethyl lead will be disposed of at the direction of your supervision.
- Before starting a repair job requiring the breaking of a tetraethyl lead line, there must be sufficient decontamination, a water hose, air masks, a pan for receiving spilled liquid and sufficient gaskets, blanks, nuts and bolts available to complete the job. Spilled TEL must be decontaminated before washing down the drain.
- Small trip cover trash cans are provided on each floor. These must be kept charged with 3" or 4" of kerosene. Contaminated gaskets, etc. are to be placed in these cans and immersed immediately. Any can with such contaminated material must be emptied before the end of that shift.
- Do NOT place broken glass, tin or wire in the large trash cans on each floor. There are special cans marked "For Glass Only" provided throughout the Plant, for broken glass.
- Steel wrenches and tools are permissible when taking nuts and bolts loose from a pipe flange and similar jobs. However, after a line is broken, a brass chisel must be used for scraping the gasket seat and similar jobs. The object of this is to prevent sparks in the presence of any inflammable material.
- Never work on an open still unless standing on step provided. Wear goggles and approved gloves.

- Keep building doors closed. The ventilation of the building is designed to operate most efficiently with closed doors.
- All rods, tools, chisels, etc. used in the still should be thoroughly cleaned after use and stored in pan in designated location or place.
- Ethyl chloride is highly inflammable. Keep sparks or open flames away.
- Recovered ethyl chloride contains tetraethyl lead and must be treated with the same respect.
- Keep area around autoclave charging head dry when the autoclave is not under pressure.
- Alloy hoppers must be grounded while on the autoclave charging head plugcock. Do not rock the alloy hopper while on the charging head plugcock, or strike the hopper slide valve stem.
- Do not open the hopper for any reason while the charging head plugcock is open.

BE ALERT FOR THE SAFETY OF OTHERS AS WELL AS YOURSELF!

2. Alloy Section

- No horseplay!
- This operation must be kept scrupulously clean and orderly at all times.
- Leather or plastic-coated gloves must be worn at all times during normal operation.
- Goggles and respirators are to be worn at any time that a hazardous condition exists or might occur. **When in doubt wear them.** Clean air masks are provided at various points about the operation in suitable cabinets. After use, the masks are to be returned to a designated place and will be picked up, cleaned and returned.
- Drain all air mask filters and catch tanks at the beginning of each shift.
- Before putting on air mask, open the valves and allow the air to blow through line, hose and face piece to thoroughly clear this part of the equipment of residual particles.
- Wear goggles whenever engaged in any of these operations:
  Measuring alloy level in pots.
  Sampling liquid alloy.
  Cleaning sight glasses or any job in vicinity of an open system.

Moving hoppers at loading booths and sampling ground alloy from hoppers.
Manipulating sodium valves.

- Wear respirators whenever engaged in any of these operations:
  Measuring alloy level in pots.
  Sampling liquid alloy.
  Cleaning sight glasses or any job in vicinity of an open system.
  Moving hoppers at loading booths and sampling ground alloy from hoppers.
  Sweeping floors or cleaning equipment.
- Use only dry soda ash (or dry salt) on any alloy or sodium fire. Dry chemical (ANSUL) or soda ash may be used for electrical and oil fires. *Keep water away.*
- Do not allow water to come into contact with either sodium or alloy. It will cause explosion and fire.
- Do not inhale any smoke or fume which might accidentally occur around alloy pots or hopper booths. Put on your respirator at once if fumes should develop.
- Never charge an alloy hopper unless it is dry and purged with N_2.
- Lids should be tightly clamped on hoppers at all times as water will accumulate when lids are loose.
- Do not breathe excessive amounts of Dowtherm vapor. Report any leaks at once so repairs can be made. The chief hazard involved in the handling or use of Dowtherm is the fire hazard. *Keep fire away.*
- Be sure measuring rod is dry before an alloy pot is measured.
- Sprinkle floors with floor sweep compound before sweeping.
- All samples must be transported to laboratory in proper carriers.
- This Plant contains many pieces of high voltage electrical equipment. Do not tamper with induction windings, connections or any electrical devices.
- Be alert for and report all oil leaks. Know the location of all motor and emergency switches.
- Keep a stock of at least six bags of soda ash at each storage platform for use in event of fire.
- Do not allow water to come in contact with sodium. It will cause explosion and fire. Moist air will sometimes ignite sodium, so exposure must be avoided.
- Sodium lines or tanks may be opened only in the presence of your supervision.

- Wear goggles and gloves whenever operating or working with sodium valves, sodium lines, nitrogen lines or valves attached to liquid sodium apparatus.
- If sodium comes in contact with the body, remove it quickly by scraping with a blunt object using care to avoid spreading over a larger area. Remove clothing, if it seems advisable, to prevent ignition of cloth. Report to Medical at once.

3. Lead Recovery Section

- No horseplay!
- Goggles shall be worn whenever the furnace doors are open, when lighting burners, when running lead, drossing wells, drossing melt pots, when cleaning any piece of equipment, or at other times when eye protection is necessary or when you are in doubt.
- Gloves are to be worn at all times except while performing work of a clerical nature. In addition to the regular treated gloves, heat resistant gloves are provided for use when running or handling hot lead.
- Air masks must be worn when entering sludge pits, cleaning dryer equipment or carrying out any operation where there is any possibility of fumes.
- A respirator is to be worn while slagging, drossing melt pots, dusting or sweeping. Keep respirator in a clean place when not in use. Sweeping must be kept to the minimum of once at the end of each shift, other than small cleanup jobs.
- A safety belt must be worn by anyone using the sludge pit walkway or entering the melt pot pit. A watcher or helper must be present. Never work alone in sludge pit or melt pot pit.
- Any spilled sludge or slag must be cleaned at once from floors, roads or equipment.
- The exhaust fan must be running whenever any work is being done in a furnace building, and all doors to the pit must be kept closed except when the openings are actually being used.
- Dipping ladles and all other tools which may require dipping into hot lead must be kept in a warm dry place when not in use.
- Cleanliness is demanded. It is part of your routine work.
- Sludge crane control room windows must be kept closed and clean.
- When transferring slag to slag bin, do not spill on roads. Clean slag from hopper and jitney before returning to furnace.

- During hot weather, furnace operators should take from two to six salt tablets per shift, and one or two vitamin "C" pills. This will help prevent heat fatigue.

- Leaks must be reported immediately and corrected as quickly as possible.
- Only one man will restack lead piles which have upset. Loose pigs will be broken loose with long handled pick before attempting to restack.
- No one but furnace operators will throw waste materials in the furnace. In order to do this, raise the door, fill the shovel and rest it in the doorway. While holding shovel handle, move to one side of opening and tilt shovel discharging contents into the furnace. Repeat until pan is empty.
- Sealed cans must have holes punched in lids by furnace operator immediately before charging to the furnace.
- When working on high places (beams, stacks, etc.), a safety belt should be worn. A respirator should be worn when using vacuum cleaner.

4. Wash and Blend Section

- No horseplay!
- Air masks must be worn whenever tetraethyl lead fumes may be present, such as when cleaning tanks, changing filter bags, investigating leaks or when working on any repair job that requires disconnecting a line which has contained tetraethyl lead, blended fluid, ethylene dichloride or ethylene dibromide.

Gas masks are worn on emergency jobs and as otherwise specified by supervision.

- A member of supervision must be present when any line or vessel containing tetraethyl lead is opened except for routine work, such as charging dye to the blenders, cleaning sight glasses, using sample booths or tank cleanup.
- Goggles must be used when carrying or using sulfuryl chloride, tri-sodium phosphate, sodium sulphide, and when carrying samples or whenever a possibility exists that eye protection may be necessary. When in doubt, wear goggles.
- All spills and leaks which may contain tetraethyl lead should be treated with a 5% solution of sulfuryl chloride or a 5% solution of potassium permanganate (never used in crystal form). After treatment, wash with water. Sulfuryl chloride is made up in a 5% solution and stored in a glass jug. Do not attempt to use the strong 100% sulfuryl chloride which is stored in steel drums.
- Waste material containing tetraethyl lead should be disposed of at the direction of the supervisor.
- Used gaskets which are contaminated must be placed immediately in the small trip cover waste cans provided. These cans must be kept charged with 3" or 4" of kerosene and the gaskets must be immersed. Any cans containing such used gaskets, etc., must be emptied before the end of the shift.
- Before starting a repair job requiring the breaking of a tetraethyl lead line, be sure the line is drained and there is sufficient 5% sulfuryl, pan and/or bucket for receiving spilled liquid and sufficient gaskets, blanks, and nuts and bolts available to complete the job. Spilled TEL must be neutralized before it is washed down the drain.
- Steel wrenches and tools are permissible when loosening nuts and bolts from a pipe flange and similar jobs. However, after a line is broken, a brass chisel or other brass tool must be used for scraping the gasket seat and similar jobs. The object of this is to prevent sparks in the presence of any inflammable material.
- Never clean a tank unless it has first been filled with water or nitrogen and approved by supervision.
- Keep sludge deposits inside tanks wet with water while cleaning tanks.
- Do not remove the water completely from a tank which is being sucked out for cleaning or inspection with vacuum. This is to prevent air from being sucked into the vacuum system.

- Keep doors closed. The ventilation of the building is designed to operate with the doors closed.
- Gasoline obtained as washings from tank cars contains "Ethyl" fluid and must be handled as such.
- No sample bottles of TEL or fluid are to be left standing around the wash and blend section. The bottles should be sucked out and the empty bottles returned to the Laboratory for cleaning.
- Be sure cars are properly grounded while being loaded.
- Empty dye drums must be lowered in the hoisting device and not dropped over railing.
- Goggles and plastic gloves must be worn during all sampling operations.

BE ALERT FOR THE SAFETY OF OTHERS, AS WELL AS YOURSELF. IF YOU DON'T KNOW, ASK!

5. Ethyl Chloride Recovery Section

- No horseplay!
- Air or gas masks must be worn whenever ethyl chloride fumes may be present. Recovered ethyl chloride contains tetraethyl lead and should be treated with the same respect as tetraethyl lead.
- Goggles must be used when taking or carrying samples, carrying or using sulphuryl chloride, or whenever a possibility exists that eye protection may be necessary. **When in doubt, wear goggles.**
- A member of Area supervision must be present when any line, pump or vessel containing contaminated ethyl chloride is opened, except for using sample booth.
- Rubber or other approved gloves must be worn while catching samples. Wash hands after sampling.
- Carry samples only in approved carriers.
- All spills and leaks must be treated with 5% sulphuryl chloride solution and then washed with water.
- Leaks must be reported immediately and corrected as quickly as possible.
- Turn on steam snuffer on tail gas lines in the event of an electrical storm. Do not climb column structure for any reason during an electrical storm.
- No welding or open flames will be permitted in this area.

6. Tank Farm

- No horseplay!
- Air or gas masks must be worn whenever tetraethyl lead, ethyl chloride or ethylene dibromide fumes may be present.
- Goggles must be worn on any job requiring an air mask, carrying or using sulfuryl chloride, or whenever a possibility exists that eye protection may be necessary. *When in doubt, wear them.*
- A member of supervision must be present when any line, pump or tank containing tetraethyl lead, ethyl chloride or ethylene dibromide is opened, except for routine dipping of tanks for inventory purposes.
- All spills and leaks which may contain tetraethyl lead must be treated with saturated (approximately 5%) potassium permanganate solution or 5% sulfuryl chloride solution and then washed with water. Check with your supervision as to which decontaminant to use.
- Ethyl chloride is highly inflammable. Keep sparks or open flames away.
- Recovered ethyl chloride contains tetraethyl lead and must be treated with the same respect.
- Ethylene dibromide or ethylene dichloride will cause painful burns and blisters if allowed to remain in contact with the skin. If either should come in contact with the skin, wash off immediately with water. Remove all clothing that is saturated with dichloride and dibromide and do not wear again until laundered. Shoes that have been exposed to liquid dibromide or dichloride should not be worn again until inspected by supervision.
- Do not climb on tanks during electrical storms.

7. Sodium Storage

- No horseplay!
- Approved spats, in good condition, are required as necessary safety protection when:

  Rodding out plugged sodium lines.

  Under unusual circumstances, when hazards are known to exist. Supervision may require spats to be worn by all persons exposed to the hazard.

  When spats are worn, the spats must be worn outside the trouser legs, with the trouser legs bloused over the top of the spats.

- Wear a face towel when:
  Rodding sodium lines.
  Specifically instructed to do so by supervision, for a special job or abnormal circumstances.
- Wear your goggles when:
  Connecting or disconnecting sodium tank cars.
  Rodding sodium lines.
  Inside the thaw house or the sodium storage tank enclosure.
  Working with or near anything which may be an eye hazard.
- Handle rods or tools contaminated with sodium in such a manner that they will not come in contact with your mitts or clothing.
- Do not use a cold rusty rod for rodding sodium lines. The rod may be damp or wet.
- If sodium comes in contact with the body or clothing, remove the sodium by quickly scraping with a blunt object. Use care to avoid spreading over a larger area. Remove clothing, if it seems advisable, to prevent ignition of the cloth. Neutralize any traces of caustic (formed by sodium and body sweat) on clothing or skin with acetic acid. Report to Medical.
- Work in this area requires the wearing of a cloth cap, felt hat or approved head covering.
- Before using a nitrogen hose, check by blowing into an area free of chemicals. If any water or water vapor is detected, do not use it. Remove the hose from the area and report this to your supervision.
- Keep several bags of dry soda ash available at car spot and tank area to be used on any sodium spills.

B. UTILITY AREA

1. Steam Generation

- No horseplay!
- A gas test is required to be made by the Laboratory in front of the boiler before lighting the pilots with the torch.
- Purge the boiler for three minutes before lighting the pilot burners.
- Wear goggles and gloves when lighting a pilot or a burner on the boilers.
- Always wear your goggles in front of the firebox.
- Be alert around the boilers. Some parts are extremely hot and serious burns may result from carelessness.

- Should it be necessary to light a boiler without the forced-draft fan running, a gas test must be made inside the firebox.
- When entering the steam or mud drum or the firebox of a boiler, the Plant's general safety rules for entering a vessel apply.
- Smoking is allowed only at the control room desk.
- No job is considered complete until it has been cleaned up.
- Wear goggles when:

  Blowing with compressed air or nitrogen.
  Operating a boiler burner valve.
  When operating an acid or caustic or chlorine cylinder valve.
  Looking into cooling tower fan housing.
  There is a possibility of a "flash."
  When dumping chemicals into the dry chemical feeders.

- When starting a cold steam turbine, drain condensate from the turbine and from the supply and exhaust steam header.
- Check the overspeed trip on the turbine before starting.
- Use handrails when climbing the stairs of the cooling tower. Be careful of splinters from weathered redwood rails.
- Be cautious when walking on top of the cooling tower, inside the cooling tower, or around the cooling water pumps. These places may be slippery.
- Wear plastic gloves when operating an acid or caustic valve.
- If chlorine gas is noted when operating a chlorine valve, tighter packing is necessary. When tightening packing, wear a chlorine cannister-type gas mask.

2. Nitrogen Generation

- No horseplay!
- Wear goggles when lighting the nitrogen generator burner.
- Purge the generator fire box before lighting the burners.
- Wear your goggles and leather gloves when lighting the burner.
- When adding or sampling MEA solution wear your goggles and plastic gloves.
- Wear your goggles and gloves when operating valves.

3. Refrigeration Section

- No horseplay!
- When starting a cold turbine, drain the condensate from the turbine and from the supply and exhaust steam header.

4. Canal Water Treatment

- No horseplay!
- Use caution when walking around the canal water station. It may be slippery.

5. Process Ditch Treater

- No horseplay!

- Before starting a repair job requiring the opening of a line or vessel, a supervisor must be present. Also sufficient decontaminant, a water hose, air masks, a pan for receiving spilled liquid, and sufficient gaskets, blanks, nuts, and bolts must be available to complete the job.
- Leaks must be reported immediately and corrected as soon as possible.
- Any spills of liquids in the area shall be considered contaminated, except water, before it reaches the process lines or equipment, and sulfuric acid before it reaches the mix feed tank or raw water sump, and must be treated immediately with 5% permanganate solution or 5% sulfuryl chloride solution and then washed away to the drain with water.
- Sulfuric acid spills must be immediately washed thoroughly with water. Acid spills on the person shall be washed thoroughly with water and reported to Medical.
- Spill of contaminated liquid on a person shall be rinsed with kerosene, washed with soap and water, and reported to Medical.
- The following procedure shall be followed if there is a spill of contaminated liquid on clothing. The individual will imme-

diately go to the Change House, take a kerosene shower followed by a water shower, then report to Medical. Contaminated clothing will be placed in designated receptacles at the Change House.

- Goggles must be used when taking or carrying samples, carrying or using sulfuryl chloride, around all equipment in the area except the switchboard, gage board, Infilco treater, or whenever a possibility exists that eye protection may be necessary. *When in doubt, wear them.*
- Carry samples only in approved carriers.
- Rubber or other approved gloves must be worn while catching samples. Wash hands after sampling.
- Air mask or gas mask must be worn whenever tetraethyl lead fumes may be present.
- Full acid equipment must be worn while filling the sulfuric acid storage tank, starting the sulfuric acid pumps, or washing the mix-feed tank.
- While transferring and washing the removal section of the Infilco treater, rubber clothing, goggles, gloves and air mask must be worn.

C. JITNEY (FORK LIFT TRUCK) OPERATION

These rules supplement the Plant general safety rules and in no way supersede them.

General

- Jitneys (fork lift trucks) are no safer than the way they are operated and maintained.
- Every operator whose duties include the operation of jitneys must be thoroughly instructed and trained in their operation and safety rules before being placed on a job which requires him to run a jitney. No one is to attempt to operate a jitney until authorized to do so.
- Under no circumstances shall any repair work be done by the jitney operator. The Maintenance department will take care of all repairs and lubrication of jitneys. Do not push a disabled jitney with the forks of another jitney; push it by backing.
- The operator must make certain that his jitney is in good operating condition by continually checking at all times. He should report any defects immediately to his foreman and *not* operate a jitney which he feels is unsafe to run. Wheels, brakes, clutch, steering gear, lifting and tilting mechanisms and horn, in particular, must be inspected at the beginning of each shift.

- Look in all directions before starting to move a jitney. Always start a jitney in low gear, travel a short distance and then shift to high gear. This applies to moving either forward or backward. When changing direction of movement to the opposite direction, always come to a dead stop and then shift gears.
- Examine the load before attempting to pick it up. Be sure the forks are properly adjusted for the particular load. *Never pick up a load "on the fly."* Always come to a stop, approach the load cautiously, lift it after the forks are well under the load, tilt it back and then move off. The load shall be carried as low as possible, consistent with safe operations. The lift shall be tilted back so as to hold the load.
- Never move improperly piled lead. If you are not in a position to restack the pile, notify the alloy or furnace supervisor immediately. If you have to restack a pile of lead which has been spilled, *use a long handle pick to break it loose.* Be extra cautious.
- When the load is delivered, place it down on a solid foundation and in a stable manner. Be sure all four legs of hoppers are resting firmly on the floor or road when they are set down. Always come to a complete stop, lower the load and then back off. *Remember to look before backing.*
- Do not run empty jitneys with forks over 8" or lower than 4" above the ground.
- The maximum speed of the jitney should be about four miles per hour. Operate even more slowly when new at this job.
- *Use extreme care in congested areas.* Only one jitney at a time is allowed in a manufacturing building tunnel. Keep to the right and observe all Plant traffic rules for motor vehicles. Avoid making sudden or jerky starts or stops. Be especially careful when going around corners so as not to cut too sharply. *Also be extra cautious when traveling up or down inclines.* Maintain a safe distance when following another jitney—20 feet is recommended at normal speed. The jitney operator must be continuously on the alert.
- When driving on roads or in buildings, be sure to sound horn when approaching a pedestrian.
- All jitneys *must be brought to a dead stop* before passing through any door or entering any passageway and the horn sounded.
- The jitney should be run forward at all times when practical. Keep backing to a minimum, chiefly for turning and when in close quarters. Always look to the rear when backing and be extra cautious.

- Watch for foreign objects in your path. Never run over anything unless absolutely necessary. When it is necessary to drive over objects that are on or across the roadway, slow down and use extra caution. Keep a firm grip on the steering wheel, or handle, at all times. Keep hands and gloves dry and free of grease.
- Particular care should be exercised in wet weather, when the ground is slippery, and at night. Report any improperly lighted area to your foreman immediately.
- Keep on hard surfaced roads or floors. Be particularly careful when running near the shoulder of a road or the edge of hard surfaced area.
- Keep all parts of the body within the protected area of the jitney. This applies particularly to hands, elbows and feet.
- Never allow anyone, other than the operator, to ride on a jitney.
- Always clean up any oil or grease which may drip from a jitney. Inform your supervisor of any leaks in oil or gas system at once, so mechanical help can be obtained.
- Park safely. Always park in designated places. Never park so as to create a hazard.
- Jitney operators are responsible for the operation and care of their jitneys. Accidents and damage to equipment must be reported immediately to the supervisor.

Special Additional Rules for Gasoline-Powered Jitneys

- Refuel only at locations specifically designated for that purpose.
- Check gasoline gauge often to prevent running out of gasoline. If it becomes necessary to transport gasoline to a jitney out of fuel, carry the fuel *only in an approved safety can.*
- Engine must be stopped before refueling. If jitney is extremely hot, allow it to cool before filling. In all cases, be sure the hose nozzle is resting against the side of the tank filler hole. Be careful to avoid spilling gasoline or overflowing the gasoline tanks. Any gasoline spilled must be flushed with water before starting the jitney.
- Inspect the flash screen in the tank filler hole at each filling and make sure it is in place and in good condition.
- Avoid idling gasoline engine in enclosed or semi-enclosed areas.

Special Additional Rules for Storage Battery-Powered Jitneys

- Do not attempt to work on, or make adjustments to, storage batteries. The storage batteries will be changed by trained maintenance personnel at the proper location—the battery recharging station at designated time.
- The acid water levels in batteries will be checked and additions made, if necessary, only by trained maintenance personnel.
- Any acid water leaks must be reported immediately. Do not allow this solution to come into contact with any part of the body. Use goggles to protect the eyes when exposed to solution from storage batteries.
- Check at start of shift, and often during the shift, to make sure the battery is locked in place.
- When the jitney is unattended, the power will be turned off or neutralized by pulling the connector plug.

Gasoline-Powered "Towmotor"

- It must be noted that the "towmotor" steers opposite from the standard gasoline jitney.

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A loaded jitney weighs more than four tons and therefore develops a large amount of momentum even at slow speeds. Bear this in mind and handle jitneys with the respect they deserve. Keep them under control.

BE CAREFUL – THE LIFE YOU SAVE MAY BE YOUR OWN!

SECTION 10

Safety Suggestions

THE COMPANY IS CONSTANTLY STRIVING to make your job and place of work accident-free by eliminating unsafe conditions and practices. Through intimate contact with the job, employees are able to spot hazards which might otherwise go undetected. If you have a suggestion for improving working conditions from the standpoint of health or safety, you are urged to submit it, on the special form that is available, to your immediate supervisor. All safety suggestions submitted and hazards reported will be given prompt attention by your supervision.

Whether or not you choose to use the safety suggestion form, *all* hazards should be reported to your immediate supervisor immediately. By doing this you will demonstrate your sincere interest in accident prevention.

SECTION 11

Plant Injury Classification

Daydreaming Causes Accidents

As an aid in promoting safety and preventing recurrence of accidents, our employees are urged to report all injuries (no matter how slight) to their immediate supervisor and then to Plant Medical as soon as they occur.

Injuries are classified according to the "American Standard Method of Compiling Industrial Injury Rates," as follows:

Precautionary Cases (First-Aid Cases)

Those cases which require only one visit to Medical and which are very minor in nature.

Minor Injuries (Medical Treatment Cases)

An industrial injury which does not interfere with employee's normal work, but requires medical treatment on two or more visits.

Sub-Major Injuries (Temporary Partial Disability)

An industrial injury which does not result in loss of time, other than the remainder of the shift on which the accident occurred, but does restrict the employee so that he is able only to partially fulfill a regularly established job which is open to the injured within his own area.

Major Injuries (Temporary Total Disability, Permanent Partial Disability, Permanent Total Disability or Death)

An industrial injury which results in death or loss of time, other than the remainder of the shift on which the accident occurred. In the case of head, chest or abdominal injuries, there is a 48-hour grace period for observation. The complete loss of any part of the body or any permanent impairment of the functions of the body, or part thereof, is also classified as a "Major Injury." The loss of teeth, fingernails or toenails are the only exceptions.

SECTION 12

Safety Award

BY FAR the greatest reward for working safely and thereby preventing accidents and personal injury is the satisfaction it brings to the individual and his family that his job can be performed in security and free from pain and worry. However, the Company wishes to recognize individuals who show their interest and ability to work safely.

When an employee completes his first year without a major or sub-major injury, and without an incident report for infraction of a safety rule, he or she receives an individual award. This award is in the form of a special lapel pin, watch fob, tie clasp or compact (for the ladies). It indicates that you have demonstrated your ability to work safely at the Ethyl Plant. You can be proud to wear it or show it.

In Conclusion

The rules listed in this booklet will serve as a guide to you in working safely on the Pacific Coast Plant of Ethyl Corporation. You should become thoroughly familiar with them and follow them.

However, **remember they are only a general guide.** Your immediate supervisor will give you specific instructions and complete safety rules for your specific job or jobs. These you must learn in detail and follow at all times. Remember, too, that the best safety "device" on this Plant is *a careful worker.*

Remember that the safety you learn on the Plant can also be applied off the job—especially at home, while on the highway or when hunting, fishing or swimming. More workmen are injured off the job than while at work.

You can do much to reduce the needless loss caused by accidents by taking your safety home with you and by practicing it, as well as teaching safe practices to your family and to your neighbors.

REMEMBER – EVERY MAN – A SAFETY MAN

BE CAREFUL – THE LIFE YOU SAVE MAY BE YOUR OWN!

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