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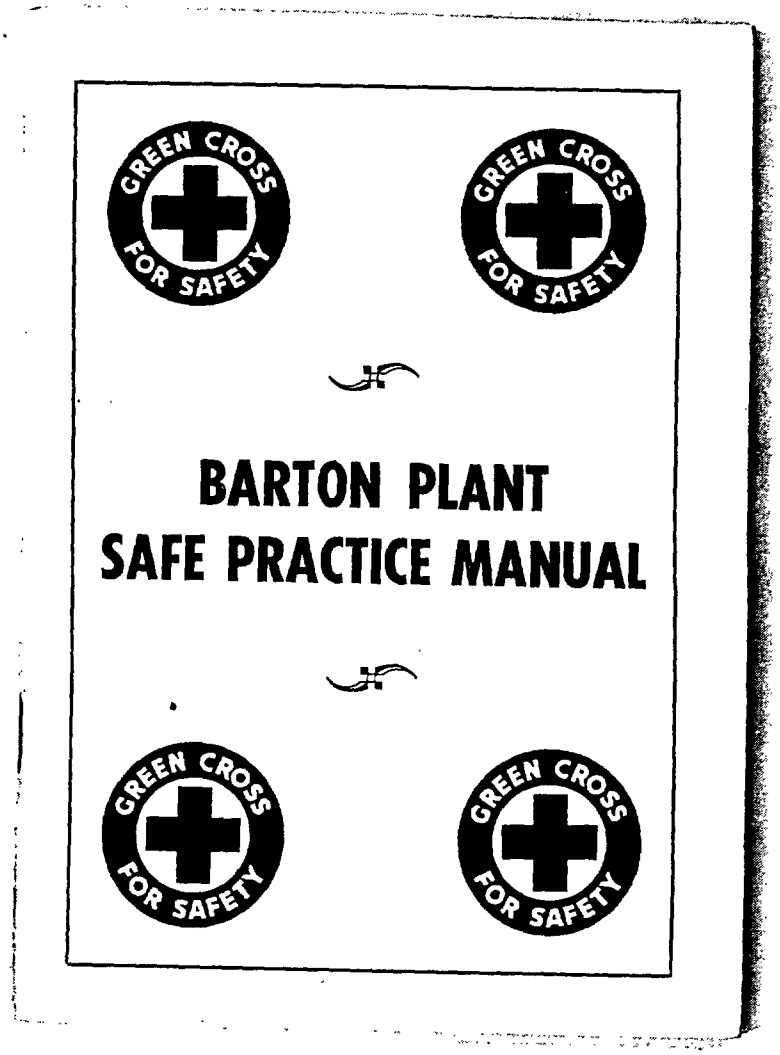

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PART I

General

1. The supervisor (defined as anyone directing people or work regardless of ordinary title) is charged with personal responsibility for the prevention of accidents.
2. He must cooperate with other supervisors in preventing accidents.
   a. All process supervisors shall cooperate fully with mechanical supervisors to the end of promoting safe performance of mechanical work in the vicinity of their equipment.
   b. All mechanical supervisors shall cooperate fully with process supervisors in all cases where work is being done on or in the vicinity of process equipment.
   c. Work shall not be started on operating units by a mechanical supervisor until the process supervisor has given his approval to begin such work in writing.
   d. When unsafe conditions are detected by a supervisor during the progress of any work he shall order the work stopped and shall notify his immediate superior at once.
3. He must know the safe methods of doing the work under his supervision.
4. He must know the safety regulations and procedures set forth in this manual and observe them himself by way of example.
5. He is responsible for the proper maintenance and

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use of all safety devices and protective equipment required for work under his supervision.

6. He must instruct his employees in the correct methods of job performance.
   a. He shall assure himself that the men working under him are competent to perform their work safely.
   b. The supervisor shall instruct new employees in safety rules and practices which apply to his work.
   c. The supervisor's instruction shall emphasize the particular hazards of the department to which the employee is assigned and the special precautions required to insure his safety.
7. He shall follow through and confirm that his instructions are understood and carried out.
   a. Supervisors are responsible for taking all possible and reasonable precautions to prevent accidents.
   b. Supervisors shall not permit the use of improper or unsafe tools or equipment.
8. Supervisors are responsible for maintaining good housekeeping.
9. No set of written rules, however complete, can provide for all situations, contingencies, or emergencies which constantly arise. Supervisors are expected to use sound judgement in the selection of methods of performing the tasks at hand.

The following rules are primarily to be observed and enforced by the supervisor:

1. Excavations when unattended shall be adequately covered or properly guarded.

2. Makeshifts of any kind shall not be used.
3. When work is completed, surplus material, junk, tools and equipment are to be removed immediately before starting another job.
4. All conditions which may affect the safety of men or equipment must be corrected at once.
5. All portable hand lights must be of the explosion proof type except in those places where the vapor proof type has been specifically approved. No portable hand light is to be used unless the outside globe and metal guard is in place.
6. Electric extension cords and lights should be inspected systematically while in use.
7. Work shall not be started on any lines or equipment before receiving the specific approval of the responsible operating supervisor.
8. Supervisors or operators in charge of operating equipment must make certain, by personal inspection, that pressure is off, lines and equipment are drained where necessary, vessels and lines are blanked off where needed, valves are locked or tagged if necessary and that it is safe to perform the work before authorizing mechanical supervisors to proceed. A special check should be made on all acid, caustic, chemical and hot oil equipment. When necessary, adjacent or connected lines or equipment should be protected against breakage.
9. Men working alone in isolated locations shall be contacted at regular intervals.
10. When work is completed, all guards, hand rails, etc., shall be replaced.

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11. Gas tests must be made before allowing an employee to enter an open top vessel or deep excavation. Such tests must be repeated at frequent intervals in recognized gaseous areas. Care must be exercised to see that all possible sources of gas accumulations are found and corrected. When it is impractical to prevent gas accumulations, precautions must be taken, including adequate ventilation or personal protective equipment.
12. No connections into or alterations of domestic water systems shall be made without the knowledge and written approval of the department concerned.
13. The number of employees working on or around a process unit must be kept to an absolute minimum when that unit is being taken out of operation or being put into operation. Process supervisors are responsible for advising appropriate mechanical supervisors when such operations are in progress.
14. Emergency showers and eye fountains shall be checked for correct operation once each day by the operator on day shift.

PART II

Personal Conduct

1. All injuries no matter how slight shall be reported immediately to your supervisor.
2. "Horseplay" is strictly forbidden.
3. Employees shall never use compressed air to clean their clothing or their person. The air horse must never be pointed toward anyone.
4. Loitering around operating units is prohibited at all times.
5. Smoking is prohibited except in designated areas.
6. Materials and tools shall not be dropped or thrown from platforms, structures, or scaffolds.
7. Work shall not be started on equipment or lines until approval to do so has been obtained from the operator in charge.
8. Employees shall never enter tanks, towers, vessels or other confined spaces without approval and proper supervision.
9. Avoid using short cuts or making pathways through process equipment areas.
10. Employees must use walkways, when provided. When it is necessary to use the roads, walk on the left side and face approaching vehicles.
11. Employees should avoid strains when lifting by keeping their backs as nearly upright as possible, using leg muscles instead of the back and stomach muscles. They should not attempt to lift more than can be safely handled.

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12. Report immediately all unsafe conditions to your foreman.
13. Running up or down stairways is not allowed.
14. Do not walk on partitions of condensers or on overhead lines.
15. Material or equipment shall not be placed nearer than six feet to any railroad track.
16. Employees must wear proper clothing at all times while working in the plant. Working without shirts or hats is not allowed.
17. The use of gasoline for cleaning purposes is strictly prohibited.

Fire Prevention

1. Welding, burning or other work requiring the use of open flames or non-explosion proof equipment is not allowed outside of areas approved for this type of work without written Fire Permit (Refer to Fire Permit Procedure).
2. The use of gasoline or other low flash fuels for cleaning purposes is strictly forbidden.
3. Smoking, except at designated locations, and carrying matches other than safety matches is prohibited.
4. All employees should become familiar with the types and location of fire extinguishers. The fire department will instruct you in the proper use of extinguishers.
5. Streams from water, foamite and soda acid extinguishers are conductors of electricity. **Do Not Use** these extinguishers on fires involving electrical equipment.

6. Report the use of fire equipment to guard office immediately.
7. Vehicles must never be parked adjacent to fire hydrants or fire equipment.
8. All aisles leading to fire extinguishers shall be kept open. Do not block access with material or equipment.
9. Fire fighting equipment shall not be tampered with.
10. Combustible materials must be kept away from open flames and overheated places.

Fire Permit Procedure

The purpose of Fire Permits is to safeguard workers, prevent fires, and protect company property and equipment. Hot work in locations where flammable, toxic, or injurious liquids and gases may be present involves special risks. These must be eliminated by strict supervision.

Hot work includes all welding and cutting operation, both oxygen-acetylene and electric arc, and the use of any open flame or heater. Soldering, buffing, grinding, chipping, drilling, hammering, scaling, sandblasting, concrete breaking, or any work where sparks may occur is also designated as hot work.

Fire Permits will be issued by the Maintenance Foreman supervising the job and shall be co-signed by the Operator on duty in the area. The Maintenance Foreman will make the necessary tests for explosive gases and hazardous conditions and the Operator will be responsible for the proper isolation, purging and tagging of lines and equipment. The Maintenance Foreman is custodian of the explosivemeter and will have the permit forms.

Permits will include the date and time of issue, and will be voided at the time specified on the face of the Permit. Permits will be specific in the description of the location they cover and the type of work to be performed.

Safety Procedure for Use of "VALVE OR SWITCH TAGS"

The purpose of the "valve" or "switch" tags is to prevent serious injury, loss of life, or property damage through prevention of unauthorized operation of valves and switches. These tags will be used in connection with maintenance work where valves and switches must be closed or opened to isolate equipment for repairs. Tags are composed of two sections, one which is to be tied to the valve or switch being tagged, and the other to be detached and retained by the men performing the work on the equipment. The tagging of the equipment will be done by the operating personnel concerned with the work being performed. The top section of the tag will be signed by the operating representative tagging the equipment. The lower section of the tag will be initialed by the mechanic performing the work and will be detached and retained by him.

Valves or switches on motor or power driven machinery or equipment must be tagged before starting a repair job. If there is a possibility of injury arising from a switch being unintentionally operated, the switch should also be locked in a safe position. Where pipelines are to be opened or sections removed for repair, the valves immediately adjacent to the section under repair must be closed and tagged. If there is a possibility of injury arising from a tagged valve being unintentionally opened, the valve should also be locked in a safe position or blinded.

Such cases would be in connection with lines handling acid, copper liquor, ammonia, combustible gases, fluids under high pressure, etc. If a valve is found to be leaking, it will be necessary to place a blind in the line before work is to be done. All vessels being entered must be checked for combustible and toxic content and thoroughly cleaned, with all inlet and outlet lines being closed off with blinds, valves tagged and, if necessary, locked,

If more than one crew is working on equipment; for example, the electrical crew, the mechanic performing the work shall place a tag on the valves or switches. He shall sign the tag, remove and retain the stub. Tags will remain attached to the valves and switches until the work indicated on the tag is completed. As each crew completes their work, the maintenance foreman or a mechanic designated by the foreman will present the stubs to the operating foreman who will then have the operating personnel remove the tags. Other tags shall remain until the crews concerned have completed their work. The operating and maintenance representatives must check the area around th equipment that has been repaired and clear all personnel and their equipment from the machines or electric circuits before removal of the tags.

Equipment that has been locked will remain locked until all tags have been removed. After removal of the tags from the equipment, if it is found that additional repairs are needed, it will be the duty of both operating and maintenance supervisory personnel to issue and retag the equipment in accordance with the foregoing written procedure.

Locks not in use shall be retained by the operating foreman, either in his desek or a cabinet designated for

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the purpose. The locks shall be "M" series and the foreman in charge of the repair, or a mechanic designated by him, shall have the key to the lock when the lock is being used to "hold" a switch or valve. The operating foreman shall also have a key in his desk or cabinet, in the event that the maintenance key is misplaced.

Eye Protection

Employees must wear the proper type goggles when performing any work, or while in an area, where a hazard to the eyes exists. To insure maximum eye protection, all types of goggles have been provided for your use. Consult your supervisor or the Safety Department for the correct type and for proper fitting and adjustment.

GOGGLES SHALL BE WORN BY EMPLOYEES WHEN —

1. Working where rust, sand or other injurious foreign objects are blowing about;
2. Working in fireboxes;
3. Cleaning and blowing tubes in boilers, stills, exchangers, etc.
4. Cleaning, repairing, or adjusting lines or equipment which contain, or have contained, chemicals or hot oil.
5. Opening, venting or bleeding lines and other equipment which have contained chemicals or pressure;
6. Melting, mixing, pouring or working with molten metals, asphalt or chemicals;
7. Adjusting packing, opening or closing chemical valves;
8. Adjusting packing glands on compressors, engines and pumps, while in operation;
9. Using air, steam or other agents to open any plugged line or vessel, or when exposed to the discharge of such agents;
10. Cleaning or lubricating stopcocks, valves, pumps or other equipment when grease plugs, pressure screws or grease guns are used;
11. Investigating or working on or around oil, gas, steam or chemical leaks;
12. Opening lines and dismantling equipment such as safety valves, pressure gauges, man-hole covers, etc.;
13. Connecting or disconnecting pressure sample bombs;
14. Making internal inspection of stills, towers, safety valves and tanks;
15. Chipping, cutting, breaking, reaming or drilling any material where a flying chip hazard exists;
16. Grinding, filing or buffing;
17. Scraping and cleaning metal surfaces;
18. Cleaning, removing or tightening gauge glasses;
19. Performing overhead work which requires the employee to look upward;
20. Using air, steam or water hose for cleaning;
21. Hammering of metal against metal;
22. Working in the vicinity of electric welding, (goggles with special lenses required);
23. Heating rivets, riveting, caulking and bucking up;
24. Scraping and spraying paint;
25. Shearing scrap metal;
26. Welding and burning;

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27. Working under rolling or stationary mechanical machinery or equipment;
28. Removing, cutting, lacing up asbestos insulation, handling granulated insulation, and performing any close insulation work;
29. Using a pick;
30. Operating concrete mixer, cement gun, sandblaster, and mixing, pouring and puddling mortar or concrete;
31. Working near machine operations where a flying chip hazard exists;
32. Cutting and cleaning brick;
33. Drilling into pipelines;
34. Heating and inspecting heated materials and equipment;
35. Working or replacing glass;
36. Using portable pneumatic tools;
37. Using metal brush;
38. Pulling with pliers, cutting wire under tension, or handling wire when a hazard of flying loose ends exists;
39. Drawing hot samples;
40. Drawing samples of light hydrocarbons, gas or chemicals from lines, vessels or other equipment;
41. Starting fires in furnaces and inspecting fires and fireboxes;
42. Gauging any tank containing chemicals;
43. Working at or near a forge.

First Aid

1. Report all injuries immediately, no matter how slight, for first aid treatment.

2. In case of serious injury to a fellow employee such as severed artery, electrocution, asphyxiation, compound fracture, etc., emergency treatment should be started immediately and a call made for additional help. If the injured person is not breathing, start artificial respiration at once. All employees are urged to complete a standard First Aid Course. Your Safety Department will assist in having a course made available for you.
3. Action to be taken in specific injury cases.
   A. Eye Injuries:
      1. Chemical burns to eyes —
         Wash eyes out immediately under shower, eye fountain, bucket of water or faucet and then report for first aid.
      2. Foreign objects (of any kind) in the eyes —
         Report immediately for first aid. Do not rub. Delay may result in a serious condition.
      3. Flash, arc or torch burns to eyes —
         Report to First Aid Room if you have been exposed to this type of burn. Delay may be serious.
   B. Burns:
      1. Steam or heat burns —
         Report to First Aid Room. Do not break any blisters.
      2. Chemical burns —
         Get under shower immediately, then remove clothes and continue to wash the body freely. Report to First Aid Room.
4. Personal Health:

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A. To prevent skin infections:
   1. Wash hands frequently.
   2. Use protective creams for handling naphtha, paints, insulation, etc.
   3. Bathe daily.
   4. Wear clean work clothes.

B. Diet:

   Eat three well balanced meals a day, especially breakfast, to minimize accident possibilities.

5. Following an accident, continue to report for first aid treatment until dismissed by the nurse or the safety engineer.

Gases

Many of the gases handled in this plant are hazardous because of their poisonous and explosive characteristics. Most are lighter than air and will tend to rise in free space. It is, therefore, necessary to maintain adequate ventilation.

The following description of the principal gases used in the plant give their toxic and hazardous properties.

A. **Natural gas**: Methane is the principal constituent of natural gas used in processing and heating. The explosive limits in air at ordinary temperatures and pressures are from 5% to 15%. Methane is not poisonous in small quantities but displaces the air and may cause asphyxiation.

B. **Hydrogen**: This is the principal product obtained from the reform furnaces and is one of the most explosive gases known. The explosive limits vary from 4% to 74%. Explosive mixtures can readily be ignited by friction, static electricity, and of course, by open flame.

C. **Carbon monoxide**: CO or carbon monoxide is a colorless, odorless and tasteless gas, and therefore, is extremely treacherous. Prolonged exposure of 1/100 of 1% is dangerous. Adequate ventilation is essential where this gas is under pressure. The explosive limits are 12.5% to 74% at ordinary temperatures and pressures. Any person affected by carbon monoxide should be kept warm and quiet. He must be taken to the hospital for a blood examination and oxygen treatment.

D. **Ammonia**: Because of its characteristic pungent odor ammonia leaks should be readily detected. The density is 60% that of air. It is a violent irritant to the eyes, nose and throat. Liquid and aqua ammonia will burn the skin; therefore, special care must be taken in handling. Ammonia gas is very soluble in water and that condition is utilized in dealing with gas leaks or burns on the body. The immediate treatment of ammonia burn is to flood it with large quantities of clean water.

E. **Carbon dioxide**: It is a non-poisonous gas; colorless, odorless and tasteless. As it is about 50% heavier than air, it will tend to collect in the lower part of any enclosure and is, therefore, best ventilated from the lowest level. It will not support combustion or life.

F. **Nitrogen**: Nitrogen made in this process is not pure but contains up to 2% carbon monoxide. It

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is considered a poisonous gas. Pure nitrogen is a non-poisonous gas constituting 80% of the air we breathe, but by itself will produce asphyxiation. It will not support combustion and is used to flush out equipment having had combustible gases.

G. **Chlorine**: It is a violent irritant producing choking, coughing and severe pains in the chest when inhaled in small quantities. It is yellow in color as a gas and heavier than air and collects at the lowest possible level.

H. **Steam**: This gas is one of the worst offenders for causing accidents and must at all times be guarded well. Due to its high specific heat, severe burns result from even short exposure to the skin. Rigid inspection is required to maintain high pressure steam pipes and vessels in good operating conditions.

I. **Nitrogen Dioxide**: NO_2 (nitric oxide) nitrogen dioxide is a brownish red gas with a pungent odor. It is extremely dangerous because fatal concentrations can be inhaled without immediate effect. It is recognized by its irritating effect on the lungs and under no conditions should anyone remain in contact with it when its presence is known or suspected. Gas masks and all service canisters will remove nitrogen dioxide in concentrations up to 2%.

Liquids and Solids

A. **Copper solution**: This solution is used in the CO purification section of the Ammonia Area and is

a poisonous caustic liquor. It is irritating to the skin and especially dangerous to the eyes so that rubber gloves and chemical goggles must be worn when handling it. Fumes of ammonia and carbon monoxide may be given off from a spill or leak; to repair such conditions proper protective gas equipment will be required.

B. **Formic acid**: Formic acid is used in making up copper solution and, like other acids, is highly corrosive and irritating to the skin. Rubber gloves and goggles must be worn at all times when handling this acid. Infection results if formic acid is allowed to enter open wounds. The fumes are dangerous to breathe and have a very disagreeable odor. An all service canister will absorb these fumes up to 2%.

C. **Nitric acid**: This acid varies in color from a reddish brown to water white. It produces painful burns upon contact with the skin. Acid proof goggles and rubber gloves must be worn when handling it. Nitric acid reacts with organic materials such as wood, cotton, leather, etc., to produce highly explosive compounds and must not be allowed to come in contact with them; its reaction on metals produces toxic nitric oxides. This acid can be neutralized with soda, ash or lime rock. Burns from nitric acid should be flooded with large amounts of H_2O and reported to First Aid.

D. **Ammonium nitrate solution**: Solutions of ammonium nitrate when allowed to evaporate, produce solid ammonium nitrate, and if allowed to

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come in contact with organic materials produce dangerous explosives. Contact with the skin produces irritating effects causing rash. Sweaty clothing absorption of this material must be avoided.

E. **Liquid caustic**: This solution is highly corrosive to the skin. Goggles and rubber gloves must be worn when handling this material. It is used in the nitrogen purification units and the ammonia purification section. All leaks must be repaired immediately on lines handling this material.

F. **Water**: Under no condition shall the sanitary water system be inter-connected with the river water system. Drinking water is provided and no employee shall drink from hose or pipes that are used in any process.

G. **Cyclohexanol**: Cyclohexanol is not as volatile as benzene but is more hazardous to the body than benzene. Anytime this material is being handled, goggles and rubber gloves should be worn. Any skin contact should be washed thoroughly with water. Cyclohexanol is a flammable liquid and a moderate fire hazard.

H. **Copper**: The copper that is used in this operation is not considered dangerous but exposure to the dust may give rise to sneezing and coughing. Safety goggles and a respirator should be worn when handling this material if it is dusty.

I. **Vanadium pentoxide**: The dust from this material may cause sneezing and coughing and possible eye irritation so that safety goggles and a dust respirator must be worn when adding this catalyst.

J. **Adipic Acid**: Adipic acid is no more dangerous than some common food acids such as citric acid. Adipic acid dust may produce some irritation of the nasal passages from prolonged inhalation and, therefore, a dust respirator must be worn if conditions are dusty.

K. **Raney-Nickel catalyst**: This catalyst must be carefully handled to avoid spills in placing the material in the make-up tank. The Raney-Nickel is a pyroohoric and ignites instantaneously when exposed to air. Any fires that do start can be extinguished with water.

L. **Liquid ammonia**: Liquid ammonia is a colorless liquid which boils violently at atmospheric temperatures and pressures, giving off ammonia gas. It produces painful burns on contact with the skin and will produce total and permanent blindness if it comes in contact with the eyes. Rubber gloves and goggles must be worn when handling liquid ammonia or when working with any line carrying it.

M. **Phenol** (Carbolic Acid) : This acid exerts locally a strong corrosive action on body tissues, and produces severe systemic reactions after absorption through the skin or other organs of the body. Goggles and rubber gloves must be worn when working with this material. Burns must be flooded with large amounts of H_2O and reported to First Aid.

N. **General**: Handling of other gases or liquids not mentioned in this book can be found in the operating manuals and adherence to the methods pre-

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scribed must be observed. Special handling must be by approved instructions.

Good Housekeeping

1. Good housekeeping is essential for the prevention of accidents and fires.
2. Remove or bend down all protruding nails using a hammer or other suitable implement. All nails in the heads of kegs on wooden barrels shall be removed when the containers are opened.
3. Place material or equipment no closer than six feet from any railroad track.
4. Keep aisles, passageways, stairs, platforms and ladders clear of all obstructions. Materials should be placed or piled to avoid stumbling hazards.
5. Oily waste or rags should be placed in a closed metal container.
6. Any oil or chemicals spilled on stairs, platforms, walkways or roads should be cleaned up immediately.
7. Waste material should not be allowed to accumulate.
8. Floors should be kept clean and in good repair.
9. Discarded bottles should never be left on floors or on yard grounds. Broken glass should be deposited in a suitable container.
10. Surplus bolts, nuts, welding stubs, tools, etc., should be removed promptly from scaffolds, platforms and structures.
11. Excess materials, cuttings and tools must be removed promptly from job site after completion of work.

Personal Protective Equipment

Personal protective equipment is provided to enable empoyees to perform work safely where the hazard involved cannot be eliminated. The selection of the proper equipment for the needs of the job is very important. As a guide in selecting equipment the following information is provided:

Respiratory Protection

Certain operations may at times contaminate the air by introducing noxious or nuisance dusts, corrosive vapors, or toxic fumes of gases. These conditions create need for a device which will either remove the substance from the air or supply a source of uncontaminated air.

In general, three different types of respiratory protection are provided. These are:

1. Canister type gas masks.
2. Chemical cartridge type respirators.
3. Dust (filter type) respirators.

Each type of equipment has a definite purpose, and the limitations of each must be kept in mind. One limitation, common to all, is their inability to provide protection in an atmosphere contaminated by a substance which may be absorbed through the skin.

1. Canister Type Gas Masks

The canister type mask absorbs gases by drawing them through a chemical filled canister. The efficiency of the canister depends on the concentration of gases present. Large amounts overload the absorbing rate, allowing some gas to pass through. Therefore, canister equipment must be used only in low concentrations of gas. The canister does not supply oxygen; it only removes a definite limited quantity of the gas for which it was designed. For these reasons, canister type masks are not approved for use in closed containers.

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Maintenance and Inspection

Masks should be carefully inspected for defects before each use and the canister checked to make certain there is sufficient time remaining for the job at hand. Canisters from which the seal has been removed over one year should be replaced. Keep masks clean and in good condition. Do not make any repairs to the mask — return it to the Safety Department at once if you find any defect. After a mask has been used, return it to the proper place.

2. Chemical Cartridge Respirators

These respirators are used for all operations where annoying gases or fumes may be present in such small quantities that the canister gas mask is not needed. Such operations as spray painting or using organic solvents in the open are examples of situations where the use of this equipment is advisable.

Limitations and Cautions

This equipment must not be used where gases or vapors may be present in high concentrations. It must not be used in closed vessels as a substitute for a canister mask. The cartridge must be changed whenever gases or fumes are detected coming through the mask or in the event the cartridges become saturated with moisture.

Once a respirator has been worn, it must not be used by anyone else util it has been returned to the Safety Department and sterilized.

3. Dust Respirators

Dust respirators must be used for all operations where there is an excessive amount of dust in the air. Such

work as handling clay, powdered chemical, lime, sulphur, etc., are examples of operations where dust respirators should be worn.

Limitations and Cautions

This equipment filters dust only and will not protect against gases, fumes, vapors or smoke. It must be properly adjusted to fit snugly around the nose and mouth and the filters should be cleaned or changed at frequent intervals as required to maintain ease of breathing.

Face and Eye Protection

To protect the eyes and face against injury from flying objects, splashing liquids, harmful gases and rays that cannot always be controlled at the source, the following types of personal protective equipment are provided:

1. Goggles and safety glasses
2. Face Shields
3. Dust and acid hoods and masks
4. Welding hoods

1. Goggles:

The causes of eye injuries are so varied that it is impossible to say under what circumstances an employee may be safe without goggles. There is hardly a job, whether in the shop, on maintenance or construction work, on any operating unit, in a laboratory, or even in an office, where an eye injury has not occurred. Based on past experience, certain jobs and operations have been designated as requiring goggles. These are covered in the section on Eye Protection. It is obvious that no one type of goggles can provide protection against the wide

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variety of eye hazards existing in the many operations in our plant. For that reason the following types are provided for the uses indicated:

Recommended Uses

Cup Type: Provides protection against a heavy impact from relatively large flying objects resulting from chipping, cutting rivets or bolts, caulking, heavy grinding, riveting, striking operations, such as breaking concrete, etc.

Special Type: There are many types of goggles provided for specific uses. Cover goggles fit over ordinary glasses and may be fitted with prescription goggles of a suitable type, subject to the approval of the plant safety engineer and provided the employee agrees to wear them during his working time. Spectacle type goggles do not replace the need for other type of eye protection specified above. In such cases, additional eye protection must be secured and used.

In all cases the employee must furnish his own prescription. He must obtain an industrial prescription from the safety department and have it completed by his oculist or optometrist and return it to the safey engineer, who will advise him when the goggles are received.

2. Face Shields

Certain operations present a hazard to the face as well as to the eyes. In such cases, a face shield provides suitable protection and is recommended for such jobs as pouring asphalt, handling chemicals or hot oil, wood working operations, etc.

3. Dust & Acid Hoods and Masks

This equipment provides protection on jobs where harmful dusts affect the eyes as well as the respiratory system. An acid hood should be used for protection of the head, eyes and face from chemical sprays and splashes. It is used for such work as opening chemical lines, hazardous emergency repair work, repairing chemical pumps, etc.

Welding Hoods

This equipment provides protection for the eyes and face under the severe conditions of arc welding. Care must be taken to see that a lens of the correct density is used and that the cover lens is replaced as frequently as required.

Head Protection

The safety or "hard hat" is necessary to protect the head against falling objects or bumps against structures or objects. Since these hazards are ever present in almost all parts of the plant, the sensible and practical course is to wear a safety hat at all times when in the plant. Electricians, linemen or other men working around open electrical equipment must never use metal safety hats. Hats made from non-conducting material are available for their use.

Hand Protection

The injurious effects of chemicals and many oils on the skin requires the use of protective gloves in certain work. Two types are provided for this service—synthetic rubber coated and plastic coated. Consult your foreman regarding any question as to the need for this protection.

Body Protection

Special acid suits, coveralls and aprons are provided for certain work requiring protection to the body. Consult your foreman regarding the use of this equipment.

Miscellaneous Items

Safety belts are provided and required for use on work performed off the ground where footing is insecure.

Sweat pads are provided to eliminate the hazard caused by perspiration from the forehead running into the eyes.

Protective creams are provided for protection of the skin against the irritating effects of certain chemicals, oils, dusts and paint.

Tank Cleaning Procedure

The following regulations for tank cleaning will also be followed when applicable to other vessels such as towers, separators, etc.

1. It is of paramount importance that thorough understanding exists between the foreman in charge of tank cleaning and the foreman in charge of the tank or vessel to be cleaned, as to — product contained in tank, purpose for cleaning, and any general information that may be beneficial in performing this work.
2. The tank cleaning foreman is responsible for assembling and readying the proper equipment for the job such as air movers, fresh air hose masks, protective clothing, etc. All equipment should be inspected prior to use to insure it is of the proper type, clean, and in good condition.

3. A survey of the surrounding area should be made before work proceeds, and any sources of ignition should be eliminated. Work should not be started during electrical storms or during periods when the wind might carry vapors into areas where ignition is possible. Smoking is prohibited and matches or lighters shall not be carried.
4. All tanks to be cleaned should be pumped down as low as possible. The remainder of the fluid, when possible, may be floated out with water.
5. Disconnect and blind off all product lines. Do not rely on closed valves.
6. All manholes should be opened to provide ventilation. Mechanical air movers must be of the explosion proof type. It is good practice, whenever possible to exhaust vapors through the roof manholes to avoid the danger of flammable vapors at ground level. If steam is used for tank ventilation, it should be introduced in or near the bottom of the tank, and the top manholes should be kept open. To minimize the hazards of static electricity, steam should be held at low velocity.
7. Before a tank may be entered, gas analysis test must be made by the foreman whose instructions shall be followed. Retests for vapors may be necessary at frequent intervals.
8. No worker is permitted to enter a gassy tank unless he is equipped with an approved mask, safety harness, protective clothing or other necessary safety equipment. At least one attendant shall be stationed near a manhole to assist or rescue in case of an emergency.

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9. Tank washing should be done from outside the manhole whenever possible until gas vapors are eliminated, or substantially reduced. Swing lines, supply lines, and all cross connections within the tank should be thoroughly washed.
10. Until a tank is gas free, use only flashlights or lanterns approved for combustible atmospheres. Do not use an extension cord light.
11. Hotwork is not permitted in a tank until the tank atmosphere is gas free.
12. Acces to manholes must be kept clear at all times. A ladder should always be used for entering a tank from above, and should be left secured in place until the last man is out of the tank.
13. All portable electrical equipment used in tank work must be grounded.
14. Certain work in a gas-free tank may present a dust problem. In such event, approved dust respirators and goggles must be worn.

PART III A

Vehicle Operation

1. Anyone driving a company vehicle must be familiar with local and state traffic rules and regulations.
2. Only authorized persons are permitted to ride in or on company cars and trucks.
3. No one shall be allowed to ride on the running boards, fenders, or tops of vehicles. Passengers must not stand, but must remain seated and keep all parts of their bodies inside the vehicle. Drivers are responsible for the enforcement of this rule.
4. When driving a company vehicle on the highways, never offer rides or pick up hitchhikers.
5. Proper directional or hand signals must always be given when turning or stopping.
6. A red signal flag must be used on any load that extends beyond the front, side or rear of vehicle.
7. Passengers shall not be permitted to jump off or on a moving vehicle.
8. More than three persons riding in the front seat is prohibited.
9. The driver of a loaded vehicle shall not permit anyone to ride on the load if, in his opinion, it is unsafe to do so.
10. It is an act of courtesy to yield the right of way at intersections. Always be considerate of the rights of others when driving because your thoughtlessness will reflect adversely on your company.
11. Before passing pedestrians, teams, or other vehicles, warn them of your approach at a reasonable distance by sounding your horn.

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12. Vehicles operated within the plant grounds should not be driven at a speed in excess of 20 M.P.H.
13. Never start or warm up the motor in a closed place.
14. Stop motor, set brakes, and turn wheels into curb when parking.
15. Vehicles must not be parked in front of fire fighting equipment or on roads or driveways that would hinder the passage of fire trucks or ambulances.
16. When following behind another vehicle maintain a minimum distance of one car length for every ten miles per hour of speed.
17. Never pass another vehicle at an intersection.
18. Keep your vehicle in safe operating condition at all times. Report any defects immediately to your supervisor.
19. If involved in an accident secure all the facts and write them down on accident form found in glove compartment. Obtain name and address of all persons involved including witnesses, location of accident, time, and extent of damage. Report the accident immediately to your department head. Refer inquiries to company officials, and sign no papers on your own authority.

Boilermaking

Employees engaged in boilermaking must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to boilermaking work.

1. Lights carried into tanks, vessels, or in areas where gas vapors are present must be of the approved explosion proof type.

2. Do not do any hot work outside of approved areas until a Fire Permit has been issued to cover the job.
3. Work on equipment in an operating area must not be started without the approval of the operator in charge.
4. Make sure that all scaffolding is substantial and provided with guard rails.
5. Loitering around anvils or furnace while work is being done is not permitted.
6. Safety belts should always be worn when working on high structures, or at any height when footing is insecure.
7. Eye protection is usually required in boilermaking work. See the section on "Eye Protection."

Bricklaying

Employees engaged in bricklaying must be familiar with and observe other sections of this manual that apply to all employees. In addition the following refers specifically to bricklaying work:

1. Goggles must be worn when chipping or cutting brick, concrete or tile. See the sections on Eye Protection.
2. It is hazardous to overload a scaffold with either men or materials. Inspect frequently — avoid overloading.
3. Have material properly stacked to prevent its falling from a scaffold or becoming a tripping hazard.
4. When doing brick work on manholes or water boxes, have the sewer lines plugged, if possible. A gas check should be made before starting work in these locations.

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5. When cutting wheel or grinder is used, be sure you are protected by wearing an approved dust respirator and goggles.
6. Avoid skin contact with cement and mortar and wash exposed parts as soon as possible. Never wade wet cement or mortar with low leather footwear.

Carpentry

Employees doing carpentry work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to carpentry work:

1. Careful inspection must be made of materials before use in building scaffolds on which men will work.
2. Scaffolds should be erected to afford maximum safety and sufficient work space for the workmen. Scaffolds should be provided with a safe means of access and equipped with proper handrails.
3. Use only standard scaffold boards equipped with cleats on metal scaffolds. These boards must be inspected and tested before use. Oily or damaged boards must not be used.
4. When erecting scaffolds close to electric wires or equipment, the supervisor in charge of electrical work must be notified and furnish any necessary protection requested.
5. When a scaffold is erected around a gauge glass or other fragile equipment, the equipment must be shielded to prevent breakage.
6. Do not climb a ladder with tools unless they have been securely fastened. Keep your hands free.

7. All nails should be removed from lumber in a structure as it is dismantled.
8. When handling lumber, guard against injury by splinters; all splinters should be removed at once in the First Aid Room.
9. Only authorized workmen shall operate power tools and machines.
10. In machine sawing, small pieces should be pushed with a stick.
11. Never reach over a moving saw to remove material from the other side.
12. Before using power saws and machines, be sure all guards are in place.

Electrical Work

Employees engaged in electrical work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to electrical work:

1. Any unauthorized person handling electric apparatus should be stopped at once and the matter reported to the foreman.
2. Never close a switch without full knowledge of why the switch was open.
3. Never handle electrical wires while standing or sitting in a wet place.
4. Be sure that the power is turned off and that the switch is tagged before working on equipment in operation, wherever possible.
5. Before opening the enclosure or dropping the oil tanks of a disconnecting switch, starter, or other electrical device containing terminals or other parts,

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make sure that the disconnection switch is open and properly locked or tagged out. While necessary in all cases, this procedure is imperative in hazardous locations where an arc may cause a fire or explosion.

6. Grounding shall be in accordance with Fire Underwriter's Rules. The neutral wire of 110 to 220 volt three wire service shall be grounded at the transformer and first service switch or cabinet. Frames of all electrical machines, all service switch boxes and conduit systems shall also be grounded.
7. Any electrical equipment in an unsafe condition or which is being improperly used must be reported immediately for correction.
8. Be sure that lights used in areas where volatile and flammable substances are present are of the approved type .
9. Employees in electrical work are furnished nonconductive safety hats. Metal hats shall not be worn when working on electrical installations.
10. When standing on hooks or climbers in elevated positions a safety belt must be worn.
11. Tools and protective equipment such as belts, gloves, climbers, etc., must be maintained in good condition and inspected at frequent intervals.

Instrument Repair

Employees engaged in instrument repair must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to instrument repair:

1. When working in the various operating areas be familiar with, and observe the rules of, those areas.

2. Approval of the operator in charge must be obtained before any instrument is removed from service.
3. When dismantling an instrument in the shop be sure that all entrapped pressure has been released.
4. Never use oil or grease on oxygen valves or fittings.
5. In drilling or venting gauge floats or hollow vessels, the work should be submerged in water.
6. Wear goggles when grinding. buffing, soldering, handling chemicals or working on an instrument under pressure. See section on Eye Protection.
7. When removing chips, drillings, etc., use a brush — do not use your hands.
8. Observe special precautions when handling mercury.

Insulation Work

Employees engaged in insulation work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to insulation work:

1. When working on hot lines or equipment, avoid unnecessary movements that might result in contacting the hot surfaces.
2. Use a safety belt when working on high places where footing is insecure.
3. Extreme caution must be used when working near electric wires or electric equipment.
4. Avoid standing on, climbing over, or pulling on small piping such as meter or gauge lines.
5. Bend down all wire lacing and reinforcements to avoid exposed ends.

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6. Do no insulate over any leaks in lines or vessels. Be sure all bolts are in place and tight before covering any equipment.
7. Proper clothing, protective goggles and gloves shall be worn when handling glass wool insulation.

Machining and Mechanical Work

Employees engaged in machining and mechanical work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to employees performing this type work:

1. When using a drill press, the work should be securely clamped to the table, jog or chuck.
2. Always use a brush to remove cuttings from a machine. Never use your hands.
3. Do not stand in line with high speed wheels. Do not use emery wheels that are out of round. For side grinding use only the special wheels provided for this work.
4. Before using a grinding wheel be sure guards are in place and that the tool rest is properly spaced.
5. Never use files without handles.
6. Always wear goggles while operating lathes, drill presses, shapers, or grinders.
7. Never wear neckties, dangling sleeves or other loose clothing while operating or working close to moving machinery.
8. Never overload chain hoists or walk under suspended loads.

9. Before making repairs to any pump or engine, be sure the pressure has been released, fluid drained, and lines, where necessary, have been drained or properly blanked off.
10. Before starting any work on operating equipment obtain permission from the operator in charge and see that switches or valves, if necessary, are tagged out of service.
11. Have proper protective equipment on hand and available for use before starting work on chemical or hot equipment.
12. When operating hydraulic press be sure guards are in place and that all persons in the immediate area are wearing goggles.
13. Do not remain on platforms or catwalks of gas engines while they are being started, and always face the engine when climbing or descending steps or ladders.
14. Oil spillage should be cleaned up promptly and waste rags put in metal containers provided for that purpose.
15. Clothing that has become saturated with any chemical or oil should be changed at once. If any portion of the body is affected it should be washed thoroughly with water and a report made to First Aid.
16. Keep aisles and passageways clear and free of oil and litter at all times.
17. When performing work on internal parts of an engine, be sure the engine has been properly tagged out of service and that a fire permit has been ob-

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tained, before operating a drill or doing other work likely to cause sparks.

18. Inspect ceiling hoist thoroughly before lifting heavy loads.
19. When pouring hot metal into a mold, always wear goggles and be sure there is no moisture present.
20. When work is completed, replace any guard that has been removed.

Painting

Employees engaged in painting must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to painting:

1. Do not paint any electrical equipment, such as switchboards, panels, etc., without an approval from the foreman in charge of electrical work.
2. Never paint hot surfaces except with an approved type paint and upon instruction by the foreman.
3. Take adequate precautions to avoid falling, before painting above machinery that is in motion.
4. When spray painting, always wear an approved type respirator.
5. Never use gasoline as a paint thinner.
6. Always wear goggles when scraping or removing old paint.
7. Gas masks must be worn when painting or scraping near vents of tanks containing toxic chemicals or poisonous gas.
8. Ladders must be in good condition and located properly when being used. The bottom should be placed

one-fourth the length of the ladder away from the vertical surface against which the top is resting.

9. Ladders used on slippery or hard surfaces must be equipped with safety "shoes" or be securely fastened to prevent slipping.
10. When working on high places where footing is insecure, wear a safety belt.
11. Before a swinging scaffold is used, all parts must be thoroughly inspected and then raised one foot from the ground and tested by applying a full load.
12. Before hammering on a vessel to remove any rust or scale, obtain permission from the operator in charge.
13. When spray painting in the shop always use the suction fan and spray booth, unless otherwise directed by the foreman.
14. When using paint and varnish remover, always wear goggles.
15. Never leave oil or paint-soaked rags in your pockets. Discard all such rags in covered metal containers.
16. When sandblasting, always wear sandblast hood and use appropriate safety equipment.

Pipe Shop Work

Employees engaged in pipe shop work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to the pipe shop:

1. Keep aisles around machines clear of obstructions.
2. Do not catch flanges by hand in backing off operations. Use a pipe or bar.

3. Use a brush to remove cuttings from the machine or the pipe — never use hands. Do not strike pipe with a hammer.
4. If chain tongs are used as back-ups while fittings are pulled or made up, machine operators and all other persons must stand in the clear at all times.
5. On heavy lifts always obtain help.
6. Wash hands at frequent intervals. Never wear clothing that is saturated with cutting oils.
7. Eye protection is required while performing certain work in the shop. Refer to section on Eye Protection.
8. Never weld, cut or beat old pipe unless it has been thoroughly cleaned and is free of toxic and/or flammable vapors.

Pipefitting

Employees engaged in pipefitting must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to pipefitting work:

1. Before breaking into or blanking any line, always obtain the approavl of the operator in charge.
2. When repairing chemical lines or equipment, goggles and protective gloves must be worn and neoprene or rubber suits and boots used when necessary.
3. When lifting, moving, or carrying pipe, keep the hands and fingers out of the ends of the pipe.
4. Lift and lower pipe at a given signal. Accidents occur when one man lifts or lowers a load before the others are ready.

5. Keep feet and hands from underneath pipe when it is being lowered.
6. Line up flanges with drift pins or flange wrenches. Keep fingers out of flange holes.
7. When stabbing, keep hands out of pipe and make sure that threads are caught before letting go. In supporting pipe for make-up keep hands clear of threads.
8. The use of "cheater pipes" on wrenches is the cause of many accidents. An employee using this type of extra leverage should be sure that the "cheater" has been made for, and fits, the wrench handle.
9. When pushing on a wrench in a close place, never wrap your fingers around the handle. Push with an open palm.
10. When unbolting a flange, loosen bolts and part the flange on the bottom side first. This way any pressure or liquid will be directed away from your face.
11. Never throw or drop tools, materials or equipment from towers, platforms or other elevations.
12. Use a wire brush to remove cuttings from a pipe. Do not clean pipe threads or flanges with your hands.
13. When working in a ditch over five feet in depth make sure it is properly shored to prevent caving.
14. Do not leave unsupported pipe on any structure or in any other place where there is danger of its falling or otherwise being a hazard.
15. Always keep pipe wrench and tong dies sharp and clean.

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Rigging & Hoisting

Employees engaged in rigging and hoisting must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to rigging and hoisting work:

1. Hoisting machinery must be inspected before it is put into use, and must be tested before being used on heavy loads.
2. Gin poles and derricks must be checked for safe working loads. If the foreman is in doubt concerning the safety factor of any hoisting equipment, the Engineering Department should be consulted.
3. Be alert to prevent anyone from walking under suspended loads or being in the vicinity of lines holding a strain.
4. When doing rigging work in the immediate vicinity of electric wires, call the foreman in charge of electrical work and request any necessary protection.
5. Hoisting machine operators must keep their eyes on the man giving signals, who must keep his attention on the load. Misunderstandings and accidents can be avoided by using the standard crane signals.
6. Rope, cable, or any type of sling should be protected with pads or blocks where it is taken around sharp edges.
7. Hoist cables should not be used if more than three adjacent wires are broken within a length of one lay, or if outer wires are worn two-thirds of their original diameter, or if marked corrosion appears.
8. In slinging pipe or any smooth-surfaced material, slings (bridle and chokers) should be placed around the object with at least two turns and fastened choker fashion.
9. Guy lines are not to be made fast to plant operating equipment, pipelines, tanks, or their supports unless authorized by both mechanical and operating superintendents.
10. Where possible, all guy derricks are to be rigged up completely on the ground with the boom lying down. In all cases, extreme care should be taken to assure sufficient length of cable. Hoist drums are to be checked for sufficient turns of cable at all times and in no case, when under strain, should the number of turns of cable on the drum be less than five.
11. Loads should not be handled by any equipment beyond the capacity and radius specified in the manufacturer's chart.
12. The operator of any crawler type machine (which is working under load) shall see that the machine is working on firm ground or mats.
13. When handling heavy loads with pneumatic-tired mobile cranes or auto cranes, which are provided with outriggers, the outriggers should be out and on good blocking. The need for this shall be determined from the manufacturer's chart or the load table prepared for the machine. Such machines shall be operated on firm ground or mats.
14. Crane operators must carefully observe the position of overhead electric wires and should avoid touching them with the crane.
15. In uncoiling wire rope it is important that no kinks be allowed to form. Since once a kink is made, no amount of strain can take it out and rope is unsafe.

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16. Loads should not be applied to ropes, cables or chains with a sudden jerk as the resulting stress will equal many times the weight to be lifted.
17. Do not leave defective chains, cables or rope lying around where there is a possibility of their being used again. Do not repair chains by bolting links or rings together.
18. Rope that has been contaminated with corrosive chemicals should never be used for hoisting.

Sheet Metal Work

Employees engaged in sheet metal work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to sheet metal work:

1. When working on roofs with a pitch and on any roof when the work is three feet or less from the edge of the roof, a safety belt shall be used.
2. Eye protection is required when soldering, using acid for cleaning metal surfaces, tying roofing ties, driving and bucking rivets, or using hammers on steel tools. See section on Eye Protection.
3. When handling tin or corrugated iron sheets and when installing sheet metal in pipes, gloves should be worn.
4. Scrap metal should not be left lying about or protruding from scrap boxes.
5. Never leave loose sheets of unused material on roof or other high places unless it is securely tied down. If it cannot be secured lower it to the ground until work is commenced.

Warehouse Work

Employees engaged in warehouse work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refer specifically to the warehouse:

1. Material must be piled or stacked properly to prevent pieces falling on workmen or passersby.
2. Never overload any equipment, hoist or conveyance.
3. Material should never be placed closer than six feet from a railroad track.
4. Aisle and runways shall be kept free of materials and obstructions.
5. Where possible, pipe should not be racked in piles higher than four feet and tiers should be separated with substantial strips and securely blocked at the ends.
6. Always store heavy, bulky parts on lower shelves and light ones on upper shelves. Do not leave stack protruding into aisles.
7. Never climb shelves or bins — use a ladder or stair provided.

Welding

Employees engaged in welding must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refer specifically to welding work:

1. A Fire Permit must be obtained before doing any cutting, welding, or other hot work except in areas approved for this type of work.

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2. The correct shade of protective lens must be used in goggles and shields when cutting or welding with either oxyacetylene or electric arc. See section on Eye Protection.
3. Protect yourself and others from reflections by using fireproof screens. Do not allow anyone to watch you at work unless he is equipped with proper shields or goggles.
4. When cutting or welding in high places, provide a means of catching hot metal, electrode stubs, and the like.
5. Oil or grease must never be used on the valves or fittings of oxygen cylinders.
6. Cylinder caps must be in place when cylinders are being moved and whenever regulators are not attached.
7. Always keep oxygen and acetylene cylinders in vertical position and properly secured to welding cart or other stationary object.
8. Cylinders should never be taken inside tanks or vessels in which work is being done.
9. Empty cylinders or drums must not be used as a work bench for cutting or welding.
10. Cylinders must always be located where sparks or cuttings will not fall on hose or cylinders.
11. Keep cylinder valves closed at all times when torch is not in use.
12. When moving cylinders, do not use cylinder caps as a means of lifting.
13. Do not attempt to repair a leaky cylinder. Remove cylinder to an open space away from fire and fellow workers.
14. After a backfire, shut off torch valves immediately —first the oxygen, then the acetylene.
15. When working in a confined area always wear a proper mask or respirator.
16. No welding is to be done on lines in service without a written fire permit.
17. Machine grounds are not to be made to handrails, stairs, or projections from control rooms, etc., or on any active process line.
18. Portable welding units must not be moved until the power is shut off.
19. Welding units must be located in places free from vapors. In operating areas, this location must be approved by the operator in charge.
20. Work grounds must be made to the object being worked on and as near as practicable to the portion being welded.
21. In any area requiring a fire permit the location of grounds for welding must be approved.
22. Acetylene generators are to be operated only by authorized personnel who are responsible for its maintenance and operation.
23. Cable couplings must be properly covered to prevent arcing when contact is made with metal surfaces.
24. Hollow or semi-hollow vessels must be opened or drilled before being heated.
25. All electric welding units operating off of line current must be grounded — when in doubt consult your foreman.

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PART III B

PRODUCTION AND OPERATION

Adipic Acid Plant

Employees in acid areas must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to adipic acid:

1. Safety goggles will be worn while in the adipic acid area.
2. Avoid breathing nitric acid and phenol fumes.
3. If cyclohexanol should come into contact with the skin it should be flushed with plenty of water.
4. When a phenol pump has to be repaired, it will first be isolated, locked off, drained, and then flushed with water.
5. Gloves and goggles should be worn while chemicals are being handled.
6. A respirator should be worn when copper vanadium pentoxide or dry adipic acid is being handled.
7. Nickel catalyst should be carefully handled to prevent spillage. When this catalyst comes into contact with air it will ignite.
8. If nickel catalyst should ignite, it can be extinguished with water.
9. Any spills of chemicals or oil should be washed down immediately.
10. Before disconnecting a steam hose, make sure all pressure has been bled off.
11. When replacing cyclohexanol filters the old filter will be submerged in a barrel of water.
12. Emergency showers will be tested by the operator in charge at least once a day.

13. Welding or other "hot work" around the area is prohibited until an approved Fire Permit has been issued.
14. If phenol comes into contact with the skin; flush with plenty of water and report to First Aid immediately.
15. If phenol should get on clothing, the clothing should be removed in order to prevent contamination of the skin.

Acid Areas

Employees in acid areas must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to acid areas:

1. Protective goggles and rubber gloves must be worn at any time there is danger of acid splashing or spraying into the eyes. See section on Eye Protection.
2. When taking acid samples, be sure the containers are completely dry before filling.
3. Acid samples shall be put in glass-stoppered bottles and carried in stainless steel bottle carriers.
4. Acid spills should be washed down immediately with large quantities of water.
5. Each employee must know the locations of all safety showers and the operator in charge shall check each shower in his area for proper working condition at the beginning of every shift.
6. Ammonia must not be trapped between closed valves in a line or vessel unless proper relief valves or devices are provided.
7. Dust respirators must be worn when working around

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conditioning agents which create a dusty atmosphere.

8. Know the location and proper use of gas masks in your area. When in doubt about the safety of any operation or piece of equipment, consult your foreman.
9. Only woolen waste and wiping rags are to be used in acid areas.
10. Cotton rags, wood, and other organic materials are prohibited. Such materials must not be allowed to come in contact with nitric acid or ammonium nitrate.
11. Areas beneath overhead acid or ammonia leaks should be barricaded to prevent personnel from walking beneath them.
12. Never pour water in acid — always pour acid in water and do it slowly.

Boiler House

Employees engaged in this work must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to the boiler house:

1. On forced and induced draft boilers, run fans for three to five minutes to purge furnace before attempting to light pilot lights.
2. Goggles must be worn when adjusting or changing burners and inspecting fires in fire box.
3. Before cutting a boiler steam line into service, see that all condensate is drained from the lines to avoid dangerous water hammer.
4. Before opening a boiler blow down valve, check to

determine that the valves on the idle boiler, or boilers under repair, are closed.

5. Where several boilers are connected to a common blow down line, men must not work in any boiler drum when blow down valves are being changed.
6. When changing water classes or tightening nuts on glass fittings, goggles must be worn.
7. When equipment is turned over to repairmen be sure that all valves are closed, and that the lines are blanked, if necessary. In case of steam, water or fuellines, bleed pressure off before approving repair.
8. Before entering a boiler or boiler setting, make sure that necessary signs are displayed advising others that men are working inside the boiler.
9. Boiler pressure guages should be calibrated, and safety relief valves pressures tested at least once each year.
10. All ladders, stairways and walkways should be maintained in good condition and kept free of materials and obstructions.
11. Men cleaning superheater and boiler tubes must wear goggles and dust respirators whenever dry, dusty conditions exist.
12. When blowing down a boiler, always open the valve fartherest away from boiler first and close last.

Laboratories

Employees engaged in laboratory work must be familiar with and observe other sections in this manual that apply to all employees. In addition, the following refers specifically to the laboratories:

1. Keep flammable products and combustible materials a safe distance away from floame or heated surfaces.
2. Highly volatile and flammable testing products should be stored away from floame or heated surface.
3. Release pressure gradually from any vessel in which pressure may be present.
4. Use proper protection when pushing glass tubing or thermometers through stoppers, and when boring holes in cork or rubber.
5. Never apply heat or pressure to cracked or broken glass.
6. Do not open centrifuge machine until machine has completely stopped.
7. Hot samples must not be poured into drains. Hot samples which are cooling must be covered and set away from other work.
8. Handle all pressure cylinders with caution to prevent dropping or falling. Valves and cylinder connections must never be lubricated with oil or grease.
9. Containers of chemicals must be clearly labeled as to contents.
10. Spillage of any mercury, chemicals or oils should be promptly cleaned up.
11. Rinse all acid bottles with water after emptying.
12. Always pour acid into water very carefully; never pour water into acid.
13. When heating flammable liquids, use electric hot plate, mantle heater or steam bath; never a Bunson flame.

14. When working in the plant, report to the operator in charge and observe all rules pertaining to the area in which you expect to work.
15. Never exceed temperatures or pressures specified for equipment being used. Always be prepared for emergencies which might arise from failure of apparatus or equipment.
16. Always secure appropriate instructions from your foreman before starting work on any experiment; make sure you understand such instructions.
17. In the event chemicals are sprayed, blown or splashed into the eyes, use an eye fountain immediately and wash eyes thoroughly for several minutes, then report for first aid.
18. Safety showers and eye fountains will be tested every day by the operator in charge.
19. Use a suction bulb when pipetting corrosive reagents; never use your mouth.
20. Avoid handling electrical connections when hands are wet or while standing on damp floors.
21. Use adequate ventilation, preferably a hood, when handling volatile organics or poisonous chemicals.
22. Eye protection is essential when drawing chemical, acid, caustic or hot oil samples, and when breaking up solid chemicals. See section on Eye Protection.
23. Good housekeeping is essential for laboratory safety. Keep work tables and cabinets orderly and do not allow dirty equipment or materials to accumulate.
24. Never leave the laboratory unattended.
25. Always use accepted techniques and good practices—never use makeshift equipment or unapproved substitutes.

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Loading Racks

Employees engaged in loading operations must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to loading racks:

1. Smoking is strictly prohibited in the vicinity of all loading racks and lighters and matches shall not be carried on the racks.
2. Jumping on or off cars is prohibited.
3. Dropboards should be placed in upright position except during loading operations.
4. Before loading transport trucks, the grounding clamps must be secured to truck frame before covers are removed.
5. All grounding and bonding of racks, rails and hose must be checked at periodic intervals for proper condition.
6. Road blocks must be placed on roads adjacent to loading racks when loading or unloading operations create hazardous vapors.
7. Protective goggles and rubber gloves must be worn when loading or unloading caustic, acid, or other toxic materials.
8. Loading and unloading of tank cars and trucks shall be discontinued during electrical storms.
9. Keep clear of cars and trucks being moved.

Process Units

Employees must be familiar with and observe other sections of this manual that apply to all employees. In

addition, the following refers specifically to employees working on process units:

1. Loitering or congregating of other employees around unit while it is in operation is not permitted.
2. Emergency showers will be tested by the operator in charge at least one a day.
3. Goggles must be worn at all times when chemical solutions are being handled. See section on Eye Protection.
4. Welding or other "hot work" around the unit is prohibited until an approved fire permit has been issued.
5. Always use stairways; do not climb lines or equipment.
6. Before opening or closing any valves make sure the line-ups are correct and other employees are in the clear.
7. When a vessel is opened for inspection or repair, an entrance order must be obtained before vessel is entered by an employee.
8. Oil and chemical spills should be washed and cleaned up immediately.
9. Be familiar with the use and purpose of each piece of equipment, be alert to emergencies.
10. Always purge fire box before lighting fire in furnace.
11. Protective equipment must be maintained in good condition and kept ready for instant use. Always replace equipment in its proper location and report

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any defective equipment to your foreman immediately.

Ammonia Building

Employees must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to the employees in the ammonia building.

1. When blowing down copper liquor or caustic gauge glasses, making up solutions or taking samples, always wear rubber gloves and protective goggles. See section on Eye Protection.
2. If a leak is detected while working in the copper liquor regeneration section, always wear a gas mask.
3. Always open high pressure valves very slowly and be alert to possible leaks on liquid ammonia valves and lines.
4. Purge piping and vessels with inert gas before allowing major repairs to equipment.
5. Whenever lines and equipment have been purged, blinds must be installed to prevent any leakage of hydrogen back into this equipment.
6. Never remain on the platform or catwalks of a gas engine while it is being started.
7. When starting an engine, roll engine over with starting air at least 30 seconds before turning on ignition.
8. Starting air pressure should be at least 230 psig before an engine is started.

9. Face engine when climbing or descending engine runways.
10. Whenever a gas leak is suspected, never go near that area without wearing a gas mask.
11. When opening or closing high pressure valves, be alert for leaks. Open valves slowly.
12. When sampling ammonia, always wear protective goggles and gloves. See section on Eye Protection.
13. Ammonia must not be trapped between two closed valves.
14. Oil spills must be cleaned up immediately.
15. Wear gloves and goggles when steaming off plugged nozzles.

Nitrate Plant

All employees of this plant must be familiar with and observe other sections of this manual that apply to all employees. In addition, the following refers specifically to the pelleting plant:

1. Regulations applying to acid areas must also be observed by employees at the pelleting plant when similar work is being performed.
2. Acid and nitrate spills shall be washed and cleaned up immediately.
3. Always keep a water hose running adjacent to location of repair work when repairing acid or chemical equipment.
4. Employees working in the clay section shall wear dust respirators at all times.

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5. Loose clothing must never be worn when working near conveyors or moving equipment.
6. Never place hands in screw conveyors or through gates on the clay hopper.
7. When a conveyor is shut down for repairs, always tag the switch in the off position. Never start any conveyor or equipment that is tagged. Consult your foreman.
8. Report any defective equipment to your foreman immediately for repairs.
9. Wear gloves and goggles when opening nitrate line drain valve.
10. All repair work to electrical equipment must be done by the electrical department. Keep the door to the switch room panels closed at all time.
11. Do not permit equipment to run over extension cords or allow them to lie in water.
12. Cotton rags, wood, and other organic materials are prohibited in this area. Such materials must never be allowed to come in contact with nitric acid or ammonium nitrate. Woolen wiping rags only are to be used.
13. Safety showers must be checked by the operator in charge at the beginning of each shift.
14. Before breaking overhead hot liquid nitrate lines, make certain that hazardous areas under the line are roped off.
15. Do not place any portion of body through bottom louvers.

Barge Loading

The following rules must be observed by employees engaging in loading or unloading barges.

1. Smoking is prohibited anywhere on the river dock or walkway leading to the dock and on the barge being loaded or unloaded.
2. Life-jackets must be worn at all times while engaged in loading or unloading barges.
3. The gangway between the dock and barge must be checked to make sure it is secure and as level as possible before using.
4. Protective goggles and rubber gloves must be worn when sampling or opening bleed valves on liquid or vapor lines on the barge.
5. Check tie up lines to make sure barges are securely tied at all times.
6. A gas mask must be kept on the barge at all times while it is being loaded.
7. When loading a barge one man shall remain on the dock at all times in order to close ammonia valves in an emergency.
8. A line shall be attached from the hydraulic system emergency shut-off valve to the dock so that this valve can be tripped from the dock in an emergency.
9. The Safety Shower on the dock must be checked each shift while loading a barge.
10. Fire hoses, life rings, life ring lines, life jackets and hausers must be inspected monthly and replaced as needed.

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PART IV

Office Safety

1. Always walk — do not run.
2. Never leave file cabinet or desk drawers open.
3. Never carry sharp wooden pencils in shirt pockets with point exposed.
4. Banks of files over three drawers high should be bolted together.
5. Women employees should never carry typewriters or other heavy equipment — male assistance should be solicited.
6. Do not stretch electrical cords across aisles or walkways.
7. Report slippery floors, spillage, etc., to your supervisor at once.
8. Do not climb on stockroom racks — use a ladder.
9. Do not attempt to repair office machinery. Report defects to your supervisor.
10. Keep all guards in place at all times.
11. Never leave paper cutter blade in "up" position.
12. Do not use razor blades or pocket knives to open cardboard cartons — use an approved carton opener.
13. Do not allow trash or other flammables to accumulate in stockrooms, etc.

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Monsanto Safety Policy

It is the policy of the company that every employee is entitled to a safe and healthful place in which to work. To this end, every reasonable effort will be made in the interest of accident prevention, fire protection and health preservation.

Vice President - General Manager

Plant Manager

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