C.L. GILMORE

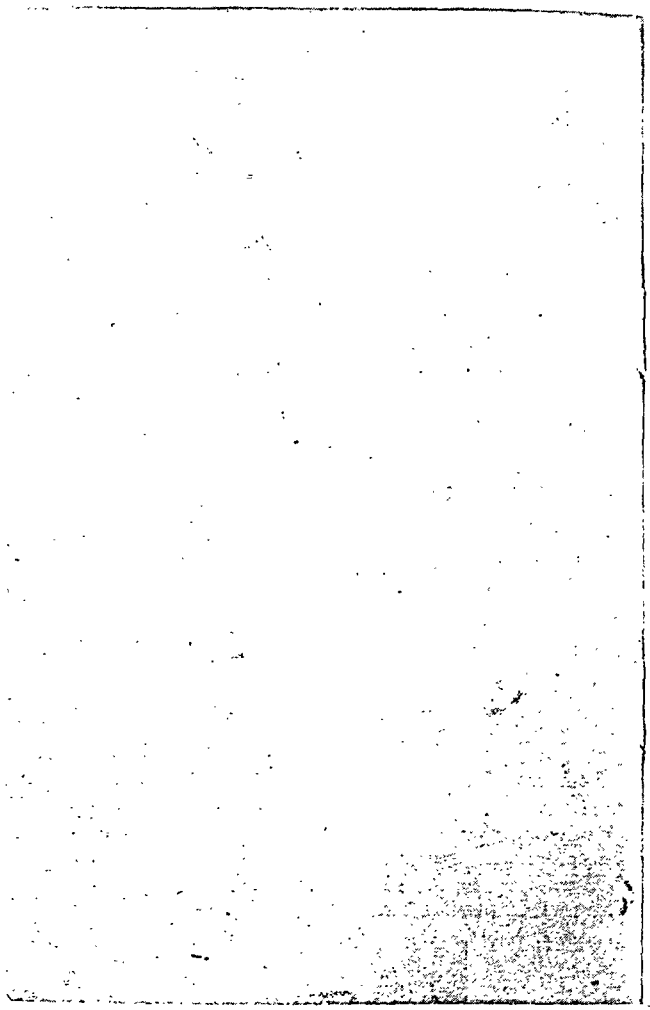
Preparation of Equipment for Maintenance or Entry

PLANT PROCEDURE No. 7

Carbide and Carbon Chemicals Company

Texas City, Texas

AUGUST 2, 1956



PLANT PROCEDURE NO. 7

SUBJECT:

PREPARATION FOR MAINTENANCE OR INSPECTION ON EQUIPMENT AND LINES

Reference: Plant letter No. 174, "Hazardous Work Permit"

Plant Letter No. 175, "Shutdown Requests"

Plant Memorandum, "Lockout Procedure"

Plant Letter No. 203

All consolidated and superseded by this issue.

When physical entry is to be made into equipment or when work is to be performed on or in lines or equipment, mobile or stationary, Plant Procedure No. 7 of this date entitled, "Preparation of Equipment for Maintenance or Entry", which supersedes all previous memoranda noted above on the same or related subjects, is to be followed.

The head of the department where the work is to be done is responsible for correct preparation, as described in the above-mentioned Plant Procedure, including permits and, where necessary, shutdown requests. The department head may delegate these duties to his assistants, but is in no way relieved of responsibilities by such delegation.

Work requiring a "Hazardous Work Permit", "Shutdown Request", or "CO Permit" may be done only with the proper permit signed by a person authorized to sign "Hazardous Work Permits", as given in the most current plant list or subsequent letter of authorization on the subject, which also denotes the hazardous areas in the plant.

The maintenance foreman assigned to the job has the responsibility of obtaining the proper permits, of checking the precautions taken to insure the safety of the men under his direction, and assuring himself that the person who gives permission to proceed is authorized to do so. When only one craft is involved, the maintenance foreman may delegate these duties to a leadman or, under conditions outlined in the above-mentioned Plant Procedure, to a craftsman, but is in no way relieved of responsibility by such delegation.

A deviation from this Plant Procedure is permissible only by letter from the appropriate assistant plant superintendent, who should send copies to the operating department head requesting exception, to the maintenance area foreman involved, and to the safety department. Deviations already approved under similar provisions of Plant Letter 203 remain valid and need not be reapproved.

T. A. Wilker
Plant Superintendent

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PLANT PROCEDURE NO. 7

SUBJECT:

PREPARATION OF EQUIPMENT FOR MAINTENANCE OR ENTRY

This Plant Procedure deals with the responsibilities and procedures for preparation of equipment (including vessels, mobile stock, electrical gear, engines, compressors, and lines) for maintenance or entry.

Only those persons listed to sign "Hazardous Work Permits", in the most current plant memorandum or subsequent letter of authorization on the subject, may authorize hazardous work, entry, or inter-area shutdown work in the areas designated. Such authorization is valid only when in the form of a signature on a properly filled out permit.

"Entry" in the sense used above includes not only physical entry of a person but also, for purposes of maintenance, the breaking of any flange on equipment up to and including the first shutoff valve.

"Hazardous Work" is defined as work involving any source of ignition, such as open flame, sparks or source of sparks, hot material, or copper acetylide or a potential source of toxic gas. The areas designated as "hazardous" are those given in the most current plant memorandum listing personnel authorized to sign a "Hazardous Work Permit".

In those areas where CO (carbon monoxide) may be present, a "CO Permit", as described below, is required.

Where shutdowns of material transfer lines or utilities services affecting more than one area are involved, a "Shutdown Request", as described below, is required.

All maintenance work requires approval by authorized personnel, either by signed permit or verbal permission, as conditions require, before the work is begun.

PREPARATION OF EQUIPMENT AND LINES

A. VESSELS AND LINES

1. Procedures

Equipment (including tanks, tank cars, barges, ship compartments, and the like, cylinders, etc.) or lines to be prepared for entry, or hazardous work, must be emptied of any hazardous liquid contents, vented, purged, blinded, washed, steamed, and cooled if necessary, ventilated, tested for hazardous gases, and checked for special requirements as noted on the "Hazardous Work Permit", as described below.

Whenever entry is to be made into equipment anywhere in the plant, or a source of ignition may be present in any area designated as hazardous, a "Hazardous Work Permit", described below, is required. Regardless of preparation or test, the first person who goes into the equipment must use a safety belt and life line, and have an observer standing by at the manhole. The use of the safety belt, life line, and outside observer must be continued as long as considered necessary by the operating and maintenance supervisors concerned.

Equipment or lines being prepared for entry or hazardous work require the following steps:

a. Emptying

All harmful liquid contents should be removed from the equipment.

b. Venting

Special care should be used when venting flammables to the air to avoid contact with any source of ignition. Where possible, a permanent vent, equipped with a steam or carbon dioxide snuffer, should be used. Where a temporary vent must be used, it should be located away from sources of ignition and preferably high in the air. It is imperative that it be grounded to the vessel venting (in the case of hose, it must have a ground wire), and that steam or carbon dioxide snuffing of sufficient capacity be provided at the outlet, or a shutoff valve that can be readily reached if the vent catches fire.

In any event, the vent should be of sufficient size to prevent overpressuring or the formation of a vacuum if cooled rapidly, as when filling with water.

c. Purging for Entry or Hazardous Work

Where flammable or toxic materials are or have been present, the equipment should be purged with an inert gas or filled with water first.

Water must be used where copper or copper alloy equipment is concerned because of the possible presence of acetylides, unless an authorized person signifies in writing it isn't necessary. (See page 15)

Water is usually advantageously used, except where its use would damage equipment or

material or cause subsequent freeze-ups, because it is positive and cooling. Care must be taken, however, to see that all other liquid is drained, to avoid leaving a hazardous atmosphere when the water is drained. If polymers are present, a hazardous atmosphere may also develop after the water is drained. It should also be remembered that cold water can pull a considerable vacuum in a hot vessel.

If water is not practical for purging, then nitrogen, carbon dioxide, steam, or some combination of these may be used.

When purging with gas, displacement is not as positive as with water. Ideally, if the purge gas is lighter than the gas to be purged, the purge should be made from the top down; if heavier, from the bottom up. The greater the difference in density between the gas or vapor to be purged and the purge gas, the easier the displacement is.

However, it should be borne in mind that flammable gases and vapors should be discharged high in the air and not at ground level. If purging is done from the top down, a vent pipe from the bottom leading back up in the air becomes necessary. Because this is sometimes impractical, heavier vapors and gases may be swept out from the bottom up by a lighter purge gas, but a greater volume of purge gas is required to do the job.

When displacement is normal, a minimum of three volumes should be used. If conditions

are not normal (i. e., if you are purging from the bottom up with a light gas), at least five volumes should be used. In either case, tests for complete purging should be made, as noted below, with care taken to see that the tests are not falsified by layering of the gases.

When flammables are involved, the purge pipe or hose and the vessel or line should be grounded together; furthermore, to prevent an influx of air, a vessel should not be opened at both top and bottom at the same time before it is purged of flammables.

After the equipment or line has been purged with water (or air), a check should be made with a suitable explosimeter. (Note that a special explosimeter is required for acetylene and hydrogen to prevent hazard from the explosimeter itself.) If a person is to enter the equipment, special tests for toxic gases may also be required, as set forth in the "Hazardous Work Permit".

Any reading on the explosimeter of any kind calls for recheck and repurge if substantiated.

When ventilation is necessary to maintain a nil reading on the explosimeter, this fact should be noted on the face of the permit and the appropriate switch or valve tagged open.

If steam, carbon dioxide, or nitrogen is used as purge gas, a direct check with the explosimeter cannot be made. The purge gas in the vessel must be replaced with air first.

Therefore, it is necessary to use a great excess of purge gas to be sure there will be no harm when air enters.

The following indications when using the purge gases are to be followed:

1) Steam

Purge until at least 30 minutes after odor decreases to a nominal level.

2) Carbon dioxide

Purge and check with Orsat for minimum of 90 per cent CO_2.

3) Nitrogen

Thoroughly mix 25 cc of the effluent gas with 75 cc of air in an Orsat burette and check the resulting mixture with an explosimeter. Any reading calls for a recheck and repurge if substantiated.

Plant air is sometimes contaminated. Therefore, an explosimeter test of the air should be made before it is used.

You are referred to more detailed information on purging in Section 3 of the "Plant Manual of Equipment Safety and Fire Control Procedures". Where there may be conflict, this memorandum will prevail.

d. Blinding

Before purging is completed, all inlet and outlet lines, including instrument leads, must have been blinded or disconnected and blanked.

Plant standard designs for blinds are at-

tached as Appendix II. Insofar as possible, only blinds meeting these standards should be used. Existing blinds may be used if they meet the standard for thickness and if they have handles. All new blinds must conform in entirety.

Those units using soft metal blinds (copper, Everdur, etc.) whose handles can be easily broken off may wish to modify the shape of the standard designs. This is permissible providing the thickness and diameters conform to the standards.

The size, series, material, maximum temperature, and maximum pressure must be stamped on the handles of all new blinds, regardless of shape or material.

Tags should be used to identify and explain the presence of blinds which have been inserted in unusual locations. Tags should also be used on valves closed preliminary to insertion of a blind at a location not visible from the valve location.

Tagged or locked valves, as well as double valves with vent or drain between, do not constitute a safe block and are not to be used in place of a blind, except as noted below:

Exceptions:

1) No blind is necessary if the repair involves no more hazard than the insertion of the necessary blinds would. This might occur when changing a gasket, packing a pump, or changing a valve in a compressor. In such cases, the

valves should be at least properly tagged out as described in Appendix I.

2) Where practical, an inert purge should be used in these cases. The use of inert gas and adequate ventilation, for instance, can be universally applied for valve changes in compressors.

3) Any wider deviation from the rule of complete blinding or disconnect is allowable only by written permission of the appropriate assistant plant superintendent.

e. Treatment for Acetylides

As stated above, all vessels or lines of copper or copper alloy should be filled with water before entry. After the water has purged the vessel or line completely, but before draining, suitable connections just below or at water level may be removed and samples taken at these points by swabbing with a wet paper towel. These samples should be sent to the Works Laboratory, which will analyze the samples within 15 minutes after receipt, providing 30 minutes prior notice is given.

If acetylides are absent, work may proceed in the normal manner.

If acetylides are present, work may proceed by written permission of the department head, providing the equipment is kept cold and wet. Note that this latter condition precludes any work on the equipment, such as burning, that will dry it out or raise the temperature.

During this work the presence of the department head or one of his assistants is required.

If work of any kind must be done on a dry surface containing acetylide, the acetylide must first be destroyed by acid cleaning, according to Sections 3 to 7 of the "Plant Manual of Equipment Safety and Fire Control Procedures". If a heavy grease or oil film is present, it must be removed first by pretreating (in an inert atmosphere) with hot caustic where film is heavy or by adding "Tergitol" to the acid if the oil coating is light.

Considerable time will be saved if acetylides are removed first, before testing, where they are known to exist.

After acid treatment, the equipment must be emptied of the acid solution, washed until neutral, and again tested for acetylides.

f. Washing

After blinding and treatment for acetylides, the equipment or lines should be washed with water, where possible without danger, to remove harmful materials and to cool.

g. Steaming

Polymers and heavy liquids will require steaming for removal.

h. Cooling

Any temperature above 120° F. (approximately 50° C.) in vessel is too hot for safe working conditions. Therefore, the atmosphere

of all vessels should be cooled to or below this temperature by use of water or adequate air ventilation before any person goes into the vessel.

i. Ventilation

To provide the proper atmosphere for work and to insure against any possible accumulation of hazardous gases in either a piece of equipment or a line, sufficient ventilation should be used to supply a complete change of air at least every five minutes. For tanks of greater than 100,000 gallons capacity, a slower general ventilating rate may be used with localized ventilation of the work area.

Where available, a positive displacement blower is recommended. Its displacement at the discharge pressure prevailing should be known, and care should be taken to see that the intake is assured of good air.

If a blower is not available, an air mover may be used. Again, what volume of air may be expected to be moved should be known. Air movers should always exhaust the air to avoid breathing plant air.

Use of plant air through an air hose is a poor third, and is allowable only when it is not to be used for breathing. The volume available through the hose should be known. Furthermore, the plant air should be checked with an explosimeter, as noted above.

j. Testing

When all other preparations are complete, but before entry or hazardous work is begun, final checks should be made.

For hazardous work without entry an explosimeter test is sufficient.

For entry, tests for any toxic gases or for oxygen content, as required on the "Hazardous Work Permit", should be made in addition to an explosimeter test.

k. Opening and Entry

When performing work on equipment and lines that have been cleared but are known to have contained such materials as hot chemicals, hot water, sulphuric acid, acetic acid, nitric acid, hydrochloric acid, acetic anhydride, crotonaldehyde, caustic soda, and ethylene amines:

The workman making the initial opening shall wear protective equipment consisting of rubber rain gear, rubber gloves, goggles, and acid hood or face cape. Ready means of access to and from the actual work must be available before the work starts. If such work is in the pipe rack or well above ground level, and if deemed necessary by the supervisor, the employee performing the job shall be provided with a life line attached to his body. The life line is to be placed over suitable support and manned at ground level. A plentiful supply of water shall be made available at the job site

before the work starts. The area shift foreman, maintenance foreman, or technical supervisor will be present to direct the work. In addition to use of the foregoing safety equipment, rubber boots are to be worn by personnel performing work on such jobs at ground level.

As described on page 9, the first person who goes into a piece of equipment must wear a safety belt and life line and be observed from outside.

2. Responsibilities of the Operating Department

In preparing equipment and lines for maintenance, the department head is responsible for correct preparation of the lines and equipment; for determination of what permits, if any, are required; and for correct execution of the necessary permits.

Detailed responsibilities imposed in execution of the various permits are given below under "Hazardous Work Permits", "CO Permits", and "Shutdown Requests". Except for signature on permits, which can be authorized only by letter, the department head may delegate execution of any or all of these duties to his assistants but is not relieved of his responsibility by so doing.

3. Responsibilities of the Maintenance Department

It is the responsibility of the Maintenance area foreman to see that proper authorization, whether by permit or otherwise, is obtained

before work is begun. It is also his responsibility to check the equipment for safe working conditions, as set forth in this procedure and as further prescribed on any permit required, both before work is begun and during its progress.

Detailed responsibilities in connection with the various permits are given below under "Hazardous Work Permits", "CO Permits", and "Shutdown Requests".

The maintenance area foreman may delegate any or all of these duties to his assistants, but is not relieved of responsibility by so doing. When only one craft is involved on a job, these duties may be further delegated to the leadman, if desired, but again the responsibility remains with the foreman.

In instances where a craftsman's immediate work is not ordinarily supervised by a leadman, as in the case of a rigger assigned to a winch truck, the craftsman himself may be delegated to obtain the permit. Where there is no craftsman aboard a truck, however, the foreman who calls the truck is responsible for obtaining the permit, a duty which may be delegated to a leadman.

B. MACHINERY AND PRIME MOVERS

1. Procedures

Before maintenance work can be done on machinery or prime movers, in addition to the preparation described above under "Equipment

and Lines", the prime mover must be positively immobilized as described below.

In addition, all necessary precautions should be taken so that the machine member normally driven does not cause the driver to turn.

a. Electric Motors

In the case of 440 volt equipment, the starter box must be locked out.

In the case of 2300 volt equipment, the isolator bar or cubicle door must be locked out, if possible, after the circuit has been properly deenergized and the isolator opened or the breaker rolled down.

If lock-out is not possible, the isolator bar or cubicle door should be tagged out in accordance with the procedure of Appendix I.

In the case of synchronous motors, the motor-generator will also be locked out in addition to the lock-out or tag-out of the 2300 volt equipment.

Proper procedures for this are described below in "Electrical Circuits and Switchgear", pages 11 and 12.

b. Steam Engines, Turbines, and Pumps

The inlet steam line and the exhaust line, if connected to a header, must be blanked or disconnected. (See exceptions on page 14.)

c. Gas Engines

The starting air line must be blanked or disconnected and the ignition disconnected or

grounded. Flywheels should be pinned and locked (or equivalent) when a person enters the crankcase, a cylinder, or when working through a valve port in a cylinder.

d. Gasoline Engines

The battery must be disconnected or the magneto grounded.

When work is to be done on a prime mover itself or to any compressor or pump attached to a prime mover, the regular preparation procedure should be followed after immobilization, as described above under "Equipment". When minor repairs are to be made, such as the replacement of a valve or valves, that involve no greater hazard than the installation of blinds, the latter are not required, but constant purge of inert gas should be used, as noted previously.

2. Responsibility of the Operating Department

It is the responsibility of the operating area foreman or department head to see that the correct procedures are followed in readying the equipment and in placing the locks.

Tags may be used for identification and explanation only.

The operating area foreman or department head may delegate the execution of these duties to a chief operator or assistant, respectively, but is in no way relieved of the responsibility by so doing.

If there is a change of shift, the operating area foreman or chief should make notation in the chief's logbook, giving the status of the equipment and listing who has the key for the lock.

Master keys for the lockout locks are kept in the general foremen's office and should be used by the general foremen only in event the individual key is lost or misplaced and only after a complete check to determine that it is safe to remove the lock.

3. Responsibility of the Maintenance Department

It is the responsibility of the maintenance foreman to see that the locks are in the proper place and that the key is in his possession before work is begun.

When only one craft is involved, the execution of this responsibility may be turned over to the leadman, if the foreman desires; or, in instances where a craftsman's immediate work is not ordinarily supervised by a leadman, as in the case of a machinist packing a pump, these duties may be delegated to the craftsman himself. These delegations of duty in no way relieve the foreman of responsibility.

It is the further responsibility of the maintenance foreman to be certain all personnel is clear before returning the key to the operating area forman or his designated representative for release of the equipment.

If there is a change of maintenance foreman or leadman, the key should be given to the foreman or leadman coming on.

C. ELECTRICAL CIRCUITS AND SWITCHGEAR

1. Identification

a. Control Rooms (440 volt Rowan controllers, motor, plug, light circuits).

All starter boxes shall be identified with the motor number and name, or the circuit name, as the case may be.

b. Substations

A sign will be placed in front of each substation breaker panel, indicating whether the utilities foreman or an operating area foreman shall be responsible for the operation of that particular breaker.

Identification signs will be placed on the tiebar of each set of isolators, designating which circuit the isolators are for. An arrow will also be placed on this bar pointing to the handle for that particular isolator.

2. Procedures

Before maintenance is done on or in connection with any electrical circuit, the preceding switch, isolator bar, or cubicle door shall be locked, where possible, or tagged in accordance with the procedure of Appendix I where there is no provision for locking after the circuit has been deenergized and disconnected as described below.

A "Shutdown Request" will be required for the disconnect of any switch affecting more than one area. For proper coordination, intra-area requests should be made through the operating area foreman.

a. Control Rooms

For circuits from individual control rooms, the appropriate controller or switch is to be locked, and the key is to be in possession of the designated maintenance department representative before work is begun.

b. Substations

For circuits from substations, the appropriate switchgear will be deenergized and tagged by the designated foreman, who will then authorize the electrical maintenance department to roll down the breaker in the case of metal-clad switchgear, or open the isolators in the case of open switchgear.

On shift, the area foreman will lower, or direct the lowering of, the breaker or opening of the isolator, providing the work to be done does not involve the electrical maintenance department. Lockout and tagout procedures should be followed, the operating foreman retaining any lockout keys himself.

The cubicle door of metal-clad switchgear or the handle of the isolator bar shall be locked out, where possible, and the key is to be in

possession of the designated Maintenance department representative before work is begun. If locking is not possible, the tagout procedure of Appendix I should be followed.

3. Responsibilities

a. Operating Department

The operating department is responsible for the correct preparation of electrical gear for maintenance, as described above under "Procedures".

1) Area Foremen

The operating area foreman is responsible for the operation of the switchgear in the unit control rooms under his jurisdiction, as described in "Procedures" above.

He is also responsible for the operation of individual 2300 volt motor switchgear, as described above, and for notification of the utilities foreman when any other substation circuit is to be removed from service.

These duties may be delegated to a chief operator, if desired, but such delegation does not relieve the foreman of responsibility.

2) Utilities Foremen

The utilities foreman is responsible for removal of substation circuits from service, other than individual motor starters, on request of the operating area foreman.

b. Maintenance Department

The maintenance foreman is responsible for seeing that the right switch is correctly locked or tagged out and for possession of the key, if there is a lock, before work is begun.

Where only one craft is involved, he may delegate these duties to a leadman, but is in no way relieved of responsibility by such delegation. In instances where the craftsman's immediate work is not ordinarily supervised by a leadman, as in the case of the evening shift electrician, the foreman may delegate these duties to the craftsman.

II. PERMITS

A. HAZARDOUS WORK PERMIT

1. Procedures

a. Purpose

To protect personnel and equipment, a properly executed "Hazardous Work Permit" (Form CT-1441) is required whenever work in a hazardous area involves spark, heat or flame, entry, copper equipment, or toxic gases.

b. Origin

The permit, for work designated as hazardous, is requested by the maintenance department and executed by the operating department, with responsibilities outlined below.

c. Limitations

A separate permit is required for each job, but one may cover several crafts. If revision is necessary, both the person who signed the permit and the maintenance man who checked should initial the change.

A new permit is required each morning at 7:30 o'clock, even though the job is continuing.

d. Execution

1) Unit or Department

The permit is to be completely filled out.

A person authorized to sign the permit is to initial the "Preparations to be Made", the "Tests—To Be Made", and the "Precautions—To be Taken" columns. Anyone acceptable to the signer of the permit may initial the "Preparations", "Tests" and "Precautions" — "Completed and Satisfactory" columns.

Special preparation requirements, tests, or precautions should be completely and clearly stated on the face of the permit.

If an open flame is involved, the area shift foreman on duty is to be notified.

Samples and analyses for acetylide testing can be obtained as described under "Treatment for Acetylides", page 15. In the case of night work, arrangements should be made to call out the appropriate laboratory personnel.

When the permit is completely filled out, it is to be signed by a member of the operating department authorized by letter to sign permits for that unit or area. After checking the equipment against the requirements of this procedure and those given on the face of the permit, the appropriate maintenance foreman is to sign where more than one craft is involved. If only one craft is involved, the leadman designated by the foreman may sign. Under special circumstances, the foreman may delegate these duties directly to the craftsman (see page 20.)

In all cases, the person who signs the permit or his designated representative will be present at the start of the work.

2) Pipe Racks

"Hazardous Work Permits" authorizing open flames on pipe racks, trenches, or roads adjacent to restricted operating units must be initialed by the area shift foreman and department head or assistant of such units involved before signature by the general foreman or authorized utilities department personnel.

Permits signed by acid plant technical supervisors or general foremen are required for non-operating personnel to enter pipe racks containing cast iron acid lines. Prior to issuing these permits, the flow of acid should be stopped and the pressure relieved on the cast iron acid line.

3) Adjacent Areas

In all cases, thought should be given to areas other than those normally covered by the person signing the permit. If there is a possibility that the operation may be hazardous to an adjacent area, that area should be notified of the condition, and, preferably, an authorized person from the area should initial the permit.

e. Use

1) General

The original of the properly executed permit is to be posted at the job site.

Where there are to be open flames, provision is to be made for continuous observation by a salaried operating supervisor.

In the event of work interruption, the equipment should be rechecked by a qualified person, as defined in the above paragraph, before work is resumed.

2) Evening and Midnight Shifts

For permit work continuing into the evening or midnight shift, the following provisions shall be made:

Complete written instructions shall be left as to the necessary precautions. If an open flame is to be encountered in the course of the work, arrangements should be made for a qualified fire watcher (salaried operating supervisor).

A copy of such a permit should be left on the desk of the operating area foreman. The foreman on duty when the work is finished or the permit expires should mail it to the process safety department.

The foreman should check such jobs as soon as practical after coming on duty, and make sure that all maintenance and operating personnel concerned are aware of the hazards present and the precautions to be followed.

For jobs extending into the following day shift the permit should be renewed by an authorized departmental man before the previous permit expires at 7:30 a.m.

For hazardous work scheduled to begin on evening or midnight shifts, the authorized person signing the permit may at his

discretion require on the permit the operating area foreman or other specified person to witness the start or progress of the work. Work may be continued without his presence, subject to the provisions above.

Emergency work during the evening or midnight shift is taken care of by the shift foremen as noted below.

2. Responsibilities

a. Operating Department

1) General

The operating department has primary responsibility for designations of hazardous work.

The person who signs the permit must be authorized to do so by letter, and is responsible for seeing that each permit is carefully filled out and that the required preparations and tests are complied with. He is further responsible for noting on the face of the permit what special procedures and precautions are to be taken, and for seeing that they are understood. (See "Execution" beginning page 13.)

Where there is any doubt as to the requirements for safe practices, the authorized person shall consult his supervisors.

In all cases, the person who signs the permit or his designated representative will be present at the start of the work.

2) Departmental Supervisors

The department head is responsible for designation of hazardous work and the correct execution and use of the "Hazardous Work Permit" in connection with it, as detailed above under "Procedures", except in cases of emergency, when the general foreman assumes responsibility as outlined below. He may delegate these duties to his assistants, subject to the requirements of authorized signature, but is not relieved of primary responsibility by so doing.

In particular, the correct execution and use of the permit require, most importantly, that the permit be filled in **completely**; that special preparation requirements, tests, and precautions be clearly stated on the permit; that the permit be signed by an authorized person; that the signer or his designated representative be present when work is started; that the permit be posted at the job site.

They further require that arrangements be made for a qualified observer when an open flame is present; that supplemental instructions be left for the area foreman when work continues into the evening or midnight shift; and that arrangements be made for renewal of any permits at 7:30 a.m.

3) Operating Foremen

a) General Shift Foremen

The general shift foreman is authorized to sign "Hazardous Work Permits" for

any area in the plant where unscheduled work resulting from breakdown or emergencies occurs and when other authorized personnel are all absent from the plant. If the general shift foreman feels that he has inadequate information on which to authorize a "Hazardous Work Permit", he should call out the department head of the unit involved. All permits authorized by the general shift foreman should be initialed by the area shift foreman where the work is to be performed.

By signature on the "Hazardous Work Permit", the general foreman assumes the responsibilities of the department head outlined above.

A copy of any permit authorized by the general shift foreman will be passed on to the foreman relieving him if the work is incomplete at the end of his shift.

As noted above, continuous observation by a salaried operating supervisor should be supplied when an open flame is present.

b. Area Shift Foremen

When notified of an open flame, as required when a permit is issued, the area foreman is responsible for close supervision of the operations in the area around the source of ignition, to minimize hazard from unexpected venting or spillage.

For scheduled work continuing into the evening or midnight shift the area foreman

is responsible for continuance of all precautions outlined in this procedure and on the face of the permit prepared by the departmental supervisors, in addition to that outlined above for open flame.

The area foreman (subject to the requirements of authorized signature) may sign permits for his area of the plant where unscheduled work resulting from breakdown or emergencies occurs during absence from the plant of the departmental supervisors. The general foreman should be notified of all permits signed by the area foreman, and should be consulted if there is any doubt as to the requirements for safe practices.

By signature on the permit, the area foreman assumes the same responsibilities outlined above under "General Shift Foreman".

b. Maintenance Department

The foreman in charge of the work is responsible for requesting a "Hazardous Work Permit", as noted under "Origin of Permit" above. He has the further responsibility of checking the precautions taken to insure the safety of the men under his direction; of checking the condition of the equipment against requirements of the permit; and of assuring himself that the person who signs the permit is authorized to do so. Where only one craft is involved, he may delegate these duties to a leadman, but is in no way relieved of responsibility by such delegation. Under special circumstances,

the foreman may delegate these duties to the craftsman. (See page 20.)

Each maintenance foreman will see that all employees under his supervision understand that they must not use spark or flame-producing tools and must not enter equipment until they have obtained permission by a "Hazardous Work Permit" signed by authorized personnel.

The maintenance foreman in charge of work involving contract work being done under the supervision of the maintenance department is responsible for seeing that the contractor and his employees understand that they cannot use spark or flame-producing tools in restricted areas without an authorized "Hazardous Work Permit".

The maintenance foreman in charge of repair work requiring a "Hazardous Work Permit" will consult with the operating department head, if necessary, in order to obtain a clear understanding of all hazards involved. He will see that leadmen and maintenance personnel assigned to the work understand the restrictions imposed by the permit.

The maintenance foreman in charge of repair work requiring a "Hazardous Work Permit" will be responsible for the use by maintenance personnel under his supervision of all normal safe practices in carrying out the repair work in addition to any special requirements set forth in the permit.

c. Construction Department or Contractors

All work performed by the construction department or contractors under the supervision of the construction department is subject to the same control by "Hazardous Work Permits" as work performed under the supervision of the maintenance department. Personnel responsible for requesting "Hazardous Work Permits" will be designated by the construction superintendent.

B. "CO PERMIT"

1. Procedure

This permit is issued to persons, other than members of the operating department, performing routine work in areas where carbon monoxide could possibly accumulate. It is not intended for use in place of a "Hazardous Work Permit" for entry into piping or equipment.

Certain areas within some operating units are designated as requiring a "CO Permit". No persons, other than members of the operating department on duty in those units, should go into these areas until they have secured a "CO Permit" (Form CT-1369).

2. Responsibilities

a. Operating Department

1. Department Head or Area Supervisor

Those persons authorized to sign "Hazardous Work Permits" for these areas are also authorized to sign "CO Permits".

2. Operating Area Foremen

The operating area foreman is also authorized to sign these permits in the absence of other authorized persons.

C. SHUTDOWN REQUESTS

1. Intra-Area

a. Procedures

Shutdowns of chemical or material transfer lines or utilities between units of the same area do not require a written form other than the "Hazardous Work Permit" or "CO Permits", where necessary. However, the other units affected, and the operating area foreman should be notified.

The actual shutdown is to be made only through the area foreman, to insure proper coordination between units.

Electrical circuits shall be removed from service according to the procedure noted under "Electrical Circuits", page 24.

If it is necessary to close the valve immediately adjacent to the main distribution header for water, fuel gas, plant air, or steam, this shall be done under the direction of the utilities foreman.

Firewater lines shall be shut off only with the authorization of the Fire Protection Division.

In all the above cases, the general shift foreman shall be notified.

b. Responsibilities

The authorized person making the request for shutdown is responsible for notification of other departments and the operating area foreman.

The area shift foreman is responsible for the coordination and execution of the job.

2. Inter-Area

a. Procedures

1. Purpose of Written "Shutdown Request", Form CT-1162

In order to promote safety in planned shutdowns involving inter-area services, which include electric, fuel gas, water, steam, and fire systems, as well as many chemical and material transfer lines, the proper authorization for such shutdowns must be obtained on form CT-1162. This will assure proper notification of all units whose operations will be affected.

2. Origin and Preparation of Request

Any department desiring inter-area work may initiate the "Shutdown Request".

In preparing the request, all areas and departments in any way affected by the proposed shutdown should be noted in the proper places on the "Request for Shutdown" form and checked by the general foreman, after which the form will be initialed by the department head or authorized personnel in his department, area supervisors, and operating area foremen of departments and areas concerned.

3. Use of Permit

For all tie-ins, revisions, or repairs to any inter-area service, a "Shutdown Request" properly filled out and signed must be in the possession of the maintenance foreman or leadman before work is started, together with a "Hazardous Work Permit" and/or a "CO Permit", if either is required. Work shall not commence until an authorized person in the department initiating the request has signed the request below the signature of the general shift foreman, and the other permits necessary, if any, are on hand correctly signed.

In case of emergency, the general shift foreman shall have jurisdiction as outlined under "Hazardous Work Permits" above.

b. Responsibilities

1. Operating Department

a. Departmental Supervisors

It is the responsibility of an authorized departmental supervisor to initiate a "Shutdown Request" whenever he desires to remove an inter-area service from operation.

It is also his responsibility to notify the area maintenance foreman or his assistant of any work request requiring such a shutdown by noting the fact on the face of the request. He should fill out the shutdown request as far as possible, designating the other departments to be notified.

Each department affected will issue

the proper shutdown instructions for his portion of the system in question. These instructions are to be issued to the area shift foreman for coordination with those of other departments or areas.

The man initiating the request or one of his supervisors should satisfy himself that all preparations have been correctly carried out and then shall make final signature to authorize the maintenance department to proceed.

b. Operating Area and Utilities Foremen

The area foreman is responsible for carrying out preparations for shutdown as outlined by the departmental supervisor for his own area in accordance with the preparation instructions above.

For shutdowns involving chemical transfer lines between departments, he will see that all draining, blowing, flushing, blanking, and locking-out and tagging are done.

For tie-ins, repairs, or revisions affecting utilities' service lines, the utilities foreman will be responsible for the operation of the header valve on the line affected, this being the valve immediately adjacent to the main distribution header and controlling the unit service line affected.

For electrical shutdowns, the Area, Utilities, and Electrical Maintenance Departments share responsibility as outlined under "Electrical Circuits", page 24.

Firewater lines shall be shut off only with authorization of the Fire Protection Division.

The operating area foreman is also responsible for coordination of his work with all other areas affected for clearance of common portions of the lines or services to avoid any injury and insure complete preparation.

When he has finished, he should initial the form and notify his general foreman.

c. General Foremen

The general foreman shall check the list of people to be notified and correct it as he feels necessary.

When he has satisfied himself that the preparations required, as indicated in the foregoing memorandum have been finished satisfactorily, he shall sign the "Shutdown Request" to indicate this.

The general shift foreman may initiate and make final signature on the "Shutdown Request", in event of emergency when other authorized personnel are all absent from the plant. In such cases, the operating area foreman affected should initial the form.

APPENDIX I.
SUBJECT:
DANGER TAGS

Purpose

"Danger" tags are for use on blinds, valves, switches, equipment out of service, equipment unsafe for use, and the like. When equipment or lines are being prepared for maintenance, their use is limited, as described in Plant Procedure No. 7.

Procedure

At the time of use, the tag is to be filled out with the name of the man placing the tag, his department, date, and the time, being certain that all necessary information is completed on both sides of the tag. Upon completion of the work, whatever its nature, all tags placed are to be removed only after all of the work indicated in the blocks beneath the wording **"Equipment Ordered Off For"** are filled in. In other words, if a piece of equipment is out of service for both mechanical and electrical repairs, the blocks opposite "Mechanical Repairs" and "Electrical Repairs" should be checked. Upon completion of the work, the man who originally signed for the mechanical repairs (assuming it is finished first) will, under **"Work Completed"** check the block opposite "Mechanical Repairs"; place the date, time and initials on the lines provided alongside. The man who originally signed for the electrical repairs will check the block oppo-

site "Electrical Repairs"; mark the date, time and initials on the same tag. Thus, the last man to complete his work would advise the Operating Department of this fact and the Operating Department would then remove the tag, noting the name and date of the person removing the tag and forward the completed tag to the Safety Division. No tag should be removed until signatures are complete.

For tags bearing the signature of a leadman, or craftsman, this same man must initial the "Work Completed" portion unless the area maintenance foreman, or the general shift foreman sign in his stead.

Because of the nature of the shift organization, it will often be necessary for one shift to remove another shift's tags. When this is necessary, tags affecting units under jurisdiction of one chief operator may be signed and removed by the chief operator. Tags affecting units under more than one chief operator must be signed and removed by the area foreman or general forman.

A new tag should be used on each and every job.

The other side of the tag carrying the wording: 1. DO NOT OPEN, 2. CLOSE, 3. _____ is to be filled in as necessary, noting the exact reason for placing the tag. On this side should be stated whether the valve or switch should be opened, closed, or left alone, and the reason

why it would not be safe to actuate or use the item or equipment on which the tag is placed.

Responsibilities

Operating Department

The department head or area shift foreman is responsible for the correct use of the "Danger" tags as described above under "Procedure", including preparation, placement and removal of the tags, when applied to operating equipment for whatever reason.

The department head may delegate these duties to an assistant or the area shift foreman to a chief operator, but such delegation does not relieve the department head or foreman of responsibility.

Placement of tags for such jobs does not in itself constitute permission to proceed with the job. The department head, area shift foreman, or designated representative, should notify the maintenance foreman or his representative to proceed with the work, as usual.

If the tag is used for other purposes, the signer assumes responsibility for preparation and use of the tag.

Maintenance Department

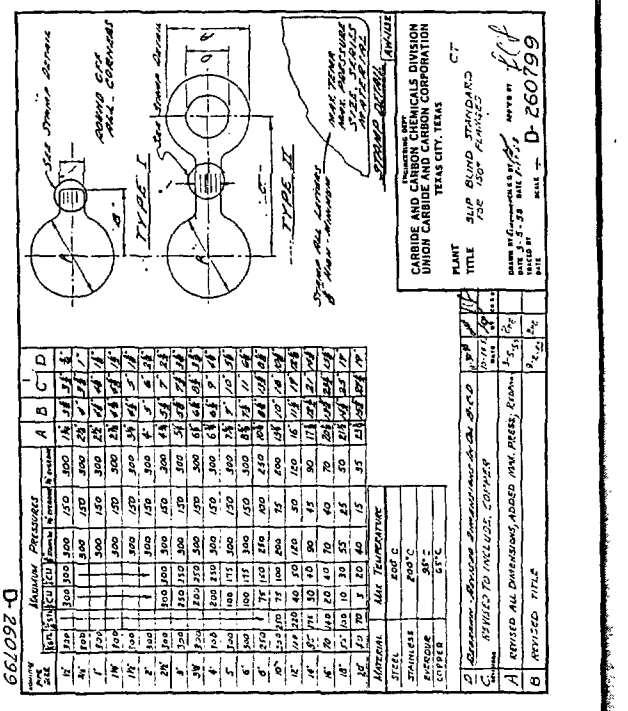
When a "Danger" tag is used in connection with maintenance work, the Maintenance area foreman is responsible for his portion of the tag, both in preparation and removal, as described above under "Procedure". In the inter-

est of his men's safety, he is also responsible for checking the use and placement of the tags.

These duties may be delegated to an assistant, and, when only one craft is involved, further delegated to a leadman or craftsman, but such delegation in no way relieves the foreman of responsibility.

Placement of tags for such jobs does not in itself constitute permission to proceed with the job. Permission should be obtained from the department head, the area shift foreman, or one of their designated representatives, in the usual manner.

APPENDIX II



APPENDIX II