GENERAL ORDER NO. 94-B
(Superseding General Order No. 94-A and all revisions thereof.)

Public Utilities Commission of the State of California

RULES GOVERNING THE DESIGN, CONSTRUCTION, OPERATION, MAINTENANCE AND INSPECTION OF GAS HOLDERS AND LIQUID HYDROCARBON VESSELS

Adopted April 29, 1952. Effective June 1, 1952.
(Decision No. 47085, Case No. 4380)
Revised by Resolution No. G-1498. Effective November 12, 1970.

Preliminary Statement

This Order establishes and prescribes a uniform procedure for the design, operation, maintenance and inspection of all gas holders and hydrocarbon vessels operated by public utilities in the State of California.

All of the provisions of this Order are mandatory except where, in certain instances, it expressly appears that such provisions are but recommendations conforming to good engineering practice. The requirements contained herein should be considered as minimum and any utility may adopt additional safety rules and practices provided they are not inconsistent with the provisions of this Order.

1. Application of Rules

The following rules shall apply to any person, firm or corporation now or hereafter engaged as a public utility in the business of furnishing manufactured gas, natural gas, hydrocarbon gas, or any mixture of gases for domestic, commercial, industrial, or other purposes within the State of California where gas service is subject to the jurisdiction of the Public Utilities Commission of the State of California.

No utility shall be relieved from the express provisions of this Order without written authorization from the Commission. If hardship results from the application of any rule herein prescribed because of special conditions, application may be made to the Commission for a modification of such rule provided that no utility shall submit any modified procedure for the approval of the Commission which is contrary to any section of this Order without submitting therewith a full and complete justification of such proposed procedure.

2. Definition of Terms

a. The word "utility" and the term "gas utility" as used in these rules shall be construed to mean any person, firm or corporation

engaged as a public utility in producing, transmitting, distributing or furnishing manufactured gas, natural gas, hydrocarbon gas, or any mixture of gases for domestic, commercial, industrial or other purposes.

b. The word "Commission" as used in these rules shall be construed to mean the Public Utilities Commission of the State of California.

c. The word "gas" as used in these rules shall be construed to mean natural gas or manufactured gas. The term "hydrocarbon liquid" or "hydrocarbon vapor" shall refer to those compounds and mixtures of compounds derived from petroleum or natural gas that exist in the gaseous state at normal atmospheric temperature and pressure, but which may be maintained in the liquid state at normal atmospheric temperature by the application of suitable pressure.

d. The term "holder" shall refer to any structure of five hundred cubic feet displacement or more, or which will contain ten thousand standard cubic feet of gas or more at the maximum design pressure, used for the storage at any pressure of natural or manufactured gas, or hydrocarbon vapors. The term "low pressure" when used in connection with holders, shall refer to waterless and water sealed holders, while the term "high pressure" shall refer to all holders capable of storing gas at pressures in excess of those normally carried by waterless and water sealed holders.

e. A "container" is defined as a length or lengths of pipe welded together with suitable end closures one or more of which may, with connecting piping, comprise a single holder constructed of pipe and fittings.

f. The term "vessel" shall refer to any structure with a capacity of two hundred gallons or more used for the storage of hydrocarbon liquids, but shall not refer to those vessels used for transporting purposes.

g. The term "inert gas" is defined as a gas which will not burn or support combustion, such as nitrogen, carbon dioxide or mixtures of such gases.

3. General Considerations for the Design of Holders, Vessels, Holder Yards, and Vessel Stations

In the selection of a site for a holder or vessel, and in the design, construction, and/or installation of a holder or vessel the following rules shall be adhered to:

a. Holders or vessels should not be erected within 500 feet of public schools or other public assembly buildings with a seating capacity of over one hundred persons.

b. All holders, vessels, and aboveground piping and fittings adjacent thereto shall be properly surrounded by adequate fencing and gates that will prevent access by unauthorized persons.

c. Except as herein otherwise provided, all electrical wiring and lighting within twenty-five feet of a holder or vessel shall be installed in accordance with the requirements of the State of California, Department of Industrial Relations, Electrical Safety Orders issued by Division of Industrial Safety for Class I, Division 2, hazardous locations, in effect at the time.

d. No holder or vessel shall, without authorization of the Commission, be constructed or installed, the height of which is more than one twenty-fifth its distance from the nearest boundary of a licensed or lawfully established commercial or military aviation landing field. All holders or vessels shall be equipped with aviation beacons or warning lights as provided in Section 4a12.

e. Except as herein otherwise provided, it is required that all high pressure holders and liquid hydrocarbon storage vessels be constructed in accordance with the provisions of the American Society of Mechanical Engineers' Boiler and Pressure Vessels Code, Section VIII, Unfired Pressure Vessels, in effect at the time of the construction. Holders constructed entirely of pipe and fittings are not included in the foregoing Code and it is required they be constructed in accordance with the latest revision of General Order No. 112. All so-called bottle-type holders which are completely fabricated and tested in the manufacturer's plant shall be subject to the provisions herein which apply to holders constructed entirely of pipe and fittings.

f. No utility shall construct or install a holder or vessel aboveground within fifty feet, or underground within twenty-five feet of an inflammable building or adjoining property that may have an inflammable building built thereon in the future, or from the nearest rail of a track on a railway private right-of-way, provided, however, that a high pressure holder designed in accordance with class locations 1 or 2, as specified in the latest revision of General Order No. 112, shall be installed underground at least 75 feet from an inflammable building or adjoining property that may have an inflammable building constructed thereon in the future, or from the nearest rail of a track on a railroad private right-of-way. The minimum clearance between holders shall be designed in accordance with the latest revision of General Order No. 112 but not less than 18 inches. Also, no utility shall construct or install an inflammable building within one hundred feet of an aboveground holder or vessel, or within fifty feet

of an underground holder or vessel. (An inflammable building shall be understood to be a building, the roof or siding of which consists of wood or other readily combustible material.)

g. Cupolas of waterless holders shall never be constructed of inflammable materials.

h. When a holder or vessel is constructed adjacent to any existing high tension electrical transmission line it shall be located no nearer the lines than the height of the poles carrying them. For the purpose of this Order a high tension electrical transmission line is defined as one normally carrying voltages in excess of 50,000 volts.

i. A recording pressure gauge shall be installed at the inlet or outlet of each high pressure holder, except that where a group of high pressure holders are jointly connected and are all filled from the same gas source and all empty into a common line or system, only one gauge will be required. A pressure gauge will be required on each vessel.

j. The utility shall retain in its files any certificates of test and approval of vessels issued by said State Division of Industrial Safety.

k. At locations where inflammable buildings, dwellings, or materials are located within 100 feet of vessels or aboveground holders, hydrants shall be provided within sufficient proximity for use in case of fire, except where such stations are sufficiently close to rivers or other sources of water, and pumping equipment for such water is provided.

l. Except as herein otherwise provided, it is required that all high pressure holders and liquid hydrocarbon storage vessels be protected by pressure relieving safety devices as set forth in Section 485 of Article 5 of the Unfired Pressure Vessel Safety Orders issued by the Division of Industrial Safety, Department of Industrial Relations of the State of California, in effect at the time, except that rupture discs shall not be permitted to serve such purpose.

Except as herein otherwise provided, the location and requirements of stop valves between the pressure relieving devices and the holder or vessel, the capacity of the pressure relieving devices and their methods of discharge shall be in accordance with the same section of the above safety orders.

m. All hydrocarbon vessels shall be provided with a pipe of small size, equipped with a valve at the end so arranged as to enable

one to determine when the liquid level reaches the maximum permitted by the State of California, Department of Industrial Relations, Unfired Pressure Vessel Safety Orders issued by Division of Industrial Safety, in effect at the time. A metal tag or plate shall be attached bearing the words: "STOP FILLING WHEN LIQUID APPEARS."

n. Whenever a holder or vessel is to be partially or wholly buried underground, that portion exposed to the soil shall be reasonably protected against soil corrosion. Protective coverings and cathodic protection are commonly employed to minimize external corrosion. Dehydration of the gas is one means of preventing internal corrosion. Records of the analyses of gas stored in holders should be maintained. Coupons placed in the gas flow are considered a guide in determining the need for internal protection. Buried coupons and periodic examinations and tests are means of determining the effectiveness of cathodic protection of the exterior of the holder.

o. Each container comprising holders constructed entirely of pipe and fittings shall be given a hydrostatic pressure test after fabrication and before operation. Containers designed in accordance with General Order No. 112 shall be hydrostatically tested to a pressure equal to that specified in General Order No. 112.

4. Operation and Maintenance

The provisions of this section shall apply to all equipment existing at the time of the effective date of this Order and to all equipment constructed or put into operation thereafter.

a. General

1. The operation and maintenance of all gas holders and storage vessels shall be under the supervision of competent engineers or supervisors designated by the responsible operating official.
2. In selecting men for supervisory work at holder or vessel yards, consideration should be given to their carefulness, thoroughness, reliability, and ability to assume responsibility in time of emergency. No person shall be delegated responsibility about a holder yard until he has been thoroughly acquainted with the nature of the work through training.
3. All leaks of any consequence in gas piping, valves and equipment in the vicinity of a holder or vessel must be promptly repaired upon discovery, or as soon as practicable. All hazardous leaks must be remedied at once.

4. Except under emergency conditions, all repairs and construction work in holder or vessel yards shall be under the direction of the supervisor in charge. Permission to proceed with such work shall be granted only after he has fully verified that all necessary precautions against fire and explosion have been taken.
5. The use of welding equipment on holders or vessels containing inflammable gases or liquids shall be permitted only after written permission has been granted by the proper operating engineer and after he has verified that all necessary safety precautions have been taken to prevent fire or explosion.
6. Persons working on holder, vessels, or adjacent piping, shall not smoke or be allowed the use of open flames or any other device that might bring about the ignition of gas escaping from a holder or vessel, except as otherwise provided in 4a5 above.
7. All utilities shall make a conscientious effort to have an understanding with local fire departments as to procedure in case of emergencies involving holder stations. Such understanding should include, among other things, the utility obtaining from the fire department, preferably in the form of drawings or maps, the location of all fire hydrants and fire fighting equipment within a reasonable distance of the various stations. This information should be available to the station operators at all times.
8. Before work is performed on any holder or hydrocarbon vessel which might bring about the admission of air to the holder or vessel, such as removing from service for internal inspection, internal repairs or dismantling, all inlet and outlet gas connections, except those opening to the atmosphere, shall be physically removed and the vessel purged with inert gases before the work is begun. The closing of inlet and outlet valves or the blanking off of inlet and outlet flanges shall not be considered sufficient precaution against the formation of an explosive mixture while the vessel is out of service.

   Before work which might bring about the admittance of air is performed on a hydrocarbon vessel, all possible liquid shall be drained therefrom before purging is begun. A sufficient quantity of steam shall be used to supplement the inert gases used for purging in order to assure the removal of all hydrocarbon vapors before the admittance of air.

   Before workmen are allowed to enter a vessel removed from service and purged with inert gases, the inert gases shall be

purged with air, or in lieu thereof, the workmen entering the vessel shall be equipped with Type "A" or "C" supplied-air respiratory masks to which air is delivered under pressure, as approved by the U. S. Bureau of Mines. In addition, before workmen without respiratory masks and equipment are allowed to enter a vessel or holder from which the inert gases have been purged with air, a test shall be made of the internal atmosphere by suitable means of analyses to detect the possible presence of a dangerous concentration of carbon monoxide.

When the interior of a holder or vessel that has been removed from service and purged of inflammable vapors is scraped, brushed, sprayed, painted, or otherwise worked on in a manner that might bring about the formation of an explosive mixture of the confined air and dust or volatile vapors, a continuous and adequate circulation of outside air through the holder or vessel by means of fans or other device shall be employed.

The circulation of air shall continue until the person in charge of the work is convinced that there is no reasonable probability of the formation of such an explosive mixture. While engaged in such work, workmen should in addition, if conditions warrant, be provided with respiratory masks, as described above, to which air is delivered under pressure.

Upon returning a purged holder or vessel to service, the air shall be purged therefrom with inert gases before gas or liquid is allowed to reenter the vessel.

All tests to determine the presence or absence of an explosive mixture in connection with the purging of a holder or vessel with inert gases or air, shall be conducted by competent operators by means of gas analysis apparatus or two explosimeters. When gas analysis apparatus is used the operator shall make sure the solutions are fresh and all parts of the apparatus are in good working order. If the tests are made by explosimeters, duplicate tests shall be conducted with two machines, both of which have recently been checked against gas mixtures of known composition.

Except as herein otherwise provided, it is recommended that all operations set forth in this paragraph 4a8, including gas analyses, be performed in accordance with the latest procedure recommended by the American Gas Association in its bulletin, "The Purging of Gas Holders."

9. All persons employed in a supervisory capacity in holder or vessel operation and maintenance shall be provided with a per-

sonal copy of this Order and be required to be thoroughly familiar with its contents.

10. Holder and vessel yards shall be kept clear of weeds, trash, papers, and other combustible rubbish, for a minimum distance of fifty feet from any holder or vessel.

11. At each high pressure holder yard there shall be placed in a conspicuous place, preferably near the operator's desk or panel board, a placard which tells the maximum safe working pressure of each holder or storage vessel.

12. Except as herein otherwise provided, all holders in excess of 100 feet that are located within five miles of a licensed or lawfully established commercial or military aviation landing field, and all holders in excess of 300 feet in height regardless of location, shall be equipped with aviation warning lights[1] as follows:

    Waterless holders shall be lighted by installing a minimum of eight 100-watt lamps: Three at approximately the one-third level, three at approximately the two-thirds level, and two at the highest point of the structure; provided, however, that where the holder is in excess of 300 feet in height a 300 mm. electric code beacon equipped with two 500-watt lamps and aviation red color shades shall replace the two 100-watt lamps at the highest point of the structure.

    Water sealed holders shall be lighted by installing three 100-watt lamps (or light of equivalent color and intensity) on top of the framework, and three 100-watt lamps (or light of equivalent color and intensity) at one other level between the one-half and two-thirds level of the holder; provided, however, that at least one of the three warning lights installed on top of the framework shall be a 100-watt lamp.

    High pressure holders shall be lighted by installing two 100-watt lamps at the top of the holder. Where a group of such holders exists, only one, perferably near the center of the group, need be lighted; however, if all of the holders are not of the same height, the lamps should be placed on the highest one.

    All lamps shall be enclosed in aviation red prismatic obstruction light globes. All aviation warning lights shall burn from sunset to sunrise, except that during periods of blackout ordered by responsible military or civilian defense authorities all

[1] It is recommended that aviation warning lights be of a type and design corresponding to those given in the latest Aeronautics Lights and Obstruction Marking Manual of the United States Civil Aeronautics Authority, Washington, D.C.

such lights shall be extinguished at once. In the case of aviation warning lights on holders which cannot be extinguished within a period of fifteen minutes after any emergency blackout order is sounded, these lights shall be permanently extinguished for the duration of the emergency. Every effort should be made to keep warning lights operating on gas holders in the immediate vicinity of important airports, except during periods of blackout. In the case of waterless and water sealed holders, lamps (or their equivalent) shall be so distributed around the circumference of the holder that at least two of them are visible to aircraft from any angle of approach.

A utility may request the Commission to be relieved from any of the above aviation lighting requirements for a particular holder, provided such request is accompanied by full information concerning the circumstances which indicate that said holder does not constitute a hazard to aviation. Conversely, in special instances where a holder is believed to be a particular hazard to aviation, the Commission may require special marking and/or additional aviation warning lights to those prescribed herein, as well as the illumination and/or marking of holders not falling within the height and geographical limitations of this section.

13. Wherever a waterless or high pressure holder or a vessel is painted, all seams on that portion of the holder or vessel being painted, which are subject to gas pressure, shall be inspected for leaks at the time of painting.

b. Waterless Gas Holders

1. A crew of at least three men, well trained in the operation of waterless holders, shall be available when needed. When, during the course of operation or inspection, it becomes necessary to enter the holder the following procedures shall be observed: One man shall remain on the upper landing or gallery in such a position that he can be in constant communication with the men on the piston. Wherever practicable, telephonic communication with the engineer's or supervisor's office shall be available to the man on the upper landing or gallery. All members of the crew shall be instructed and periodically drilled in an accepted method of artificial respiration or resuscitation.

2. Employees before entering or descending to the piston chamber shall satisfy themselves that the motor driven elevator, or hand operated safety hoist and folding ladders are in proper operating condition and that all first aid and protective equipment are

at their specified locations. No one other than qualified inspectors of waterless holders or responsible executives of the company shall enter the interior of any waterless holder unless accompanied by a responsible employee thoroughly familiar with all operations of the holder.

If any item of the mechanical apparatus is not operating properly or gives indication that it is not in satisfactory operating condition, no descent to the piston shall be made until the item is placed in proper working condition. The safety basket on the hand-operated safety hoist shall be ready for immediate use before descending to the piston.

3. All holders of this type shall have as a minimum the following items of first aid and protective equipment readily accessible at the specified locations:

   (a) Two pieces of self-contained oxygen breathing apparatus of at least one hour capacity each. This equipment shall be of a type approved by the U. S. Bureau of Mines and shall be located as follows:

   One on upper platform or balcony.

   One on piston.

   Due to the complexity of this apparatus and the hazards attendant to its use, operators shall receive thorough training in its use and no one shall be permitted to operate such equipment under any condition who has not received such training. The apparatus shall be completely inspected and tested at least every three months. The apparatus shall be completely recharged and placed in working condition as soon as possible after use, and at such other times as inspections indicate that it is warranted.

   (b) Four fire-proofed woolen blankets located as follows:

   Two on upper platform or balcony.

   Two on piston.

   (c) A sufficient number of extra oxygen cylinders shall be readily available on the holder or adjacent thereto.

4. The doors and entrances to stairways and external elevators on this type of holder shall be kept locked at all times to prevent access by unauthorized persons. When it becomes necessary to unlock such doors and locks, it shall be done by authorized employees only.

5. Precautions shall be taken to prevent the possibility of a vacuum being pulled on the holder during emptying by the installation of indicating gauges, automatic stops, alarms or similar devices.

c. Water Sealed Holders

1. Stairways and ladders of water sealed holders shall be kept clear for use at all times.
2. Guides and rollers shall ge kept well greased.
3. Water or oil used for seals shall be kept at a suitable depth to prevent unsealing.

   Excessive amounts of oil or other protective mediums shall not be allowed to remain on the exterior surface of water seals.
4. Tanks shall be kept free of rubbish.
5. During winter months snow and ice shall not be permitted to accumulate to any great extent on holder crowns or within the cups.
6. The operator of water sealed holders shall be observant of any wear or operating irregularities that might be indicative of faulty design, settlement of foundations, or other indication of trouble or failure.

d. High Pressure Gas Holders

1. All valves, fittings, regulators, and pressure relief devices shall be kept in working order and reasonably protected from trespass.
2. The maximum safe operating pressure of the holder shall be known to the operator, recorded as provided in 4a11 and not exceeded except in emergency and with the full knowledge and approval of the proper operating executive of the utility. The maximum safe working pressure shall be determined in accordance with the provisions of the American Society of Mechanical Engineers Boiler and Pressure Vessels Code, Section VIII, Unfired Pressure Vessels. The maximum safe working pressure of holders constructed entirely of pipe and fittings shall be determined in accordance with General Order No. 112.
3. All drips and drain lines shall be kept free of obstruction and in proper working order at all times.

e. High Pressure Liquid Hydrocarbon Vessels

1. Except as herein otherwise provided, all vessels of this type shall be maintained and operated in accordance with the Unfired Pressure Vessel Safety Orders, issued by the Division

of Industrial Safety, Department of Industrial Relations of the State of California, and in effect at the time; however, no reconstruction of vessels is required in order to comply with said Unfired Pressure Vessel Safety Orders, if the vessels were acquired prior to April 1, 1940.

2. All valves, fittings, regulators, and pressure relief devices shall be kept in working order and reasonably protected from trespass.
3. The maximum safe operating pressure of the vessel shall be known to the operator, recorded as provided in 4a11, and not exceeded except in emergency and with the full knowledge and approval of the proper operating executive of the utility. This pressure can be determined from the inspection reports of said State Division of Industrial Safety or other qualified inspectors.
4. All drips and drain lines shall be kept free of obstruction and in proper working order at all times.
5. In order to provide for liquid expansion with temperature, liquid hydrocarbon storage vessels shall not be filled to a greater fraction of their volumes than is permitted by said Unfired Pressure Vessel Safety Orders, in effect at the time.
6. At stations where equipment is employed for vaporizing the gas the vaporizer shall be located outside of buildings except those buildings devoted exclusively to gas manufacturing and distribution operations. Such buildings shall be of approved fireproof construction and well ventilated from points near the floor and roof.

   Any device supplying the necessary artificial heat for producing the steam, hot water, or other heating medium for the gas vaporizers shall be equipped with a full safety shutoff control.

   When such devices are located under a common roof with the gas vaporizers they shall be located in a separate compartment or room, which shall be separated from compartments or rooms containing liquefied petroleum gas vaporizers, pumps or central gas mixing devices by a fire wall containing no openings through which free vapors might flow. In the case of vaporizers employing artificial heat they shall be provided with a safety relief valve of adequate capacity at or near the outlet of the vaporizer. Direct-fired hydrocarbon vaporizers and heaters shall only be allowed after special authorization has been granted by the Commission.

5. Inspection Procedure

The provisions of this Section shall apply to all equipment existing at the time of the effective date of this Order and to all equipment constructed or put into operation thereafter.

a. General

1. After the effective date of this Order holders and vessels shall be completely inspected as outlined under the applicable provisions of 5b, 5c, 5d, or 5e, hereafter, at time intervals designated therein, dating from the last complete inspection that has been accepted by the Commission.

   In order for a utility to receive acceptance from the Commission of a complete inspection, the utility must furnish complete copies of the reports of the inspections and also satisfy the Commission that all repairs incident to placing the holder or vessel in a safe operating condition have been made.

2. Each utility shall employ a standard set of inspection forms prescribed by the Commission for recording data obtained at the time inspections are made. Copies of all forms shall be filed with the Commission.

   Complete copies of all inspections are to be kept on file by the utility for a period of at least five years. Copies of all annual general inspections and inspections covering longer intervals of time are to be kept on file by the utility as long as the holder or vessel remains in existence.

3. Routine daily, weekly, monthly, and quarterly inspections of equipment may be made by the regular station operators. Where the utility system consists of more than one property the annual general inspection of equipment should be made by a supervisor or engineer from the head office or a competent outsider.

4. The monthly and annual inspection reports for all holders and vessels shall contain a general summary of the operating condition of the holder or vessel, and indicate any changes, repairs, or improvements that appear advisable.

5. The annual general inspection report of each holder and vessel shall include a description and typical analysis of the gas or gases stored therein during the past year. Analyses shall particularly indicate the content of hydrogen sulphide, carbon dioxide, oxygen, and other corrosive impurities.

6. Whenever the internal inspection of a holder or vessel is contemplated, it shall first be removed from service and entered in accordance with the provisions of 4a8 of this Order.

b. Waterless Holders

1. Whenever it becomes necessary to enter a holder of this type the procedure described under 4b1 and 4b2 shall be adhered to.
2. Only experienced electricians shall be employed to inspect or supervise the inspection of eletrical equipment at the site of a waterless holder. Rigid inspections of such electrical equipment are necessary to ensure proper insulation and the proper operation of elevators, pumps, lights, and other equipment depending upon this kind of energy.
3. The following minimum inspections shall be made and recorded:

Daily:

Pump runs on each pump.
Check proper operation of oil pumps.
Check graphic pump run recorder.
Check holder pressure chart.

Weekly:

Check average level of oil in cups.
Check oil risers for leaks.
Check condition of inside and outside elevators.
Oil elevator machinery.
Pump drips on inlets and outlets to holder.
Inspect beacon lights.

Monthly:

Check and grease piston rollers.
Check guide shoe clearances.
Check tilt of piston.
Check safety rails on balconies and stairs, safety hoist, and folding ladder.
Check gas content of atmosphere above piston at several locations by means of two explosimeters, or gas analysis.
Check first aid and protective equipment.

Quarterly:

Make analysis of sealing tar or oil for viscosity and other important chemical and physical characteristics.

Annual General Inspection:

General inspection of holder for corrosion, paint condition, and operation of all equipment. A test and inspection of all exterior and interior elevator safety devices, cables, hoists, rope baskets, drums, and sheaves shall be made by trained elevator inspectors, preferably of, or deputized by, the State Division of Industrial Safety. Observations shall be

made as to whether roof vents prevent entrance of water in the seals and if skimmers are functioning satisfactorily.

Additional Inspections:

After a waterless holder has been in service for a period not to exceed twenty years, and at intervals not exceeding twenty years thereafter, a complete and thorough internal and external inspection shall be made and reported upon by competent outside inspectors not regularly in the employ of the utility, who are selected by the utility and are agreeable to the Commission. Details of what shall constitute these inspections will be found set forth in the inspection forms prescribed by the Commission. The person or persons making such inspections shall submit a complete report of the condition of each holder to the company and at the same time forward a copy to the Commission. When such holders as are inspected are found to be in a defective and hazardous condition they shall not be returned to service until repaired and placed in a safe and workable condition.

In the years that the inspections described above are made, the utility will not be required to make the regular annual general inspection.

c. Water Sealed Holders

1. The following minimum inspections shall be made and recorded:

Weekly:

Note general condition and inspect any parts requiring attention.

Check depth of water in cups.

Empty inlet and outlet drips. Note general condition of lifts, tank water, guides and rollers. Observe water overflow. Inspect beacon lights.

Monthly:

Check lubrication of guide rollers, check paint, preservative on side plates, cleanliness of balconies, stairways, and condition of safety equipment. Without interference to regular operation of holder, observe for corrosion and indication of leaks such as rust spots, odors, and blowing of gas. Determine if guide rollers track properly and if guide roller frames have sufficient clearance from guide columns. Determine if an excessive amount of protective oil has collected on water in cups and if cups are free of rubbish and sediment.

Annual General Inspection:

General external inspection of holder paint condition and indications of corrosion. Note condition of holder framework. Leak tests shall be made on all portions of the holder subject to gas pressure; portions of holder ordinarily submerged during operation shall be tested by lowering lifts into water and observing for bubbles; portions of holder subjected to gas pressure that are not submerged in regular operation may be checked for leaks by other methods. All leaks and their disposition shall be recorded on the report forms. Remove external condensates and other corrosive deposits from the holder framework, tank or crown. Check holder cups for corrosion at the water line. Clean cups of dirt, rubbish, leaves, ashes and other foreign matter collected in them. Check plumb of guide framing, guides, and guide rollers for clearance, alignment and wear. Rollers shall not improperly bind on guides. Test holder water for hydrogen ion concentration by an approved quantitative method.

Additional Inspections:

After a water sealed holder has been in service for a period not to exceed twenty years, and at intervals not exceeding twenty years thereafter, a complete and thorough external inspection shall be made and reported upon by competent outside inspectors not regularly in the employ of the utility who are selected by the utility and are agreeable to the Commission. The condition of the crown, side plates, rollers, and permanent frame shall be determined. Plugs of metal shall be cut from, or holes bored in, the crown plates and side plates, calipered for thickness, and observed for degree of corrosion. Crown seams should be given particular attention. If, as a result of the external inspection, the inspector's report asserts the condition of the holder is such that an internal inspection is advisable, the holder shall be removed from service, dewatered if necessary, and a complete and thorough internal inspection made; provided, however, that should the utility not concur with the inspector's recommendation for an internal inspection, the matter may be submitted to the Commission for final decision.

The utility may, if it desires, voluntarily have an internal inspection made in addition to the required external inspection. If such an internal inspection is made, the utility

shall be relieved of the requirement of cutting plugs from, or boring holes in, the crown plates and side plates to observe for degree of corrosion, unless the results of the internal inspection indicate they are warranted.

Details of what shall constitute these inspections will be found set forth in the inspection forms prescribed by the Commission. The person or persons making such inspections shall submit a complete report of the condition of each holder to the company and at the same time forward a copy to the Commission. When such holders as are inspected are found to be in a defective and hazardous condition they shall not be returned to service until repaired and placed in a safe workable condition.

In the years that the inspections described above are made, the utility will not be required to make the regular annual general inspection.

d. High Pressure Gas Holders

1. The following minimum inspections shall be made and recorded:

Monthly:

Check by actual operation the working condition of all valves, regulators, and other automatic equipment, except relief valves. Check expansion rollers, gauges, and other equipment. Inspect and operate drips. Determine if relief-device shutoff valve (if any) is locked open.

Annual General Inspection:

General inspection of holder for condition, indications of corrosion and condition of paint. Check yard for cleanliness and fencing. Test all connections, manholes, and fittings on holder for leaks with soapsuds. All leaks and their disposition shall be shown on the report form.

Check by actual operation all relief equipment and all automatic features pertaining thereto.

An examination shall be made of foundations and supports to ascertain if all saddles and piers are fully supporting the holder. Any settlement which will produce uneven and excessive strain shall be corrected at once.

Additional Inspections:

Except as hereinafter provided, after a high pressure holder has been in service for a period of ten years, and at intervals not exceeding ten years thereafter, a complete and thorough internal and external inspection shall be made

and reported upon by competent outside inspectors not regularly in the employ of the utility, who are selected by the utility and are agreeable to the Commission, with the following exception: At locations where groups of two or more holders other than holders constructed entirely of pipe and fittings exist, of the same type of materials and design, built at the same time and subjected during the interval to identical service conditions, no less than twenty percent, nor less than one, of the holders in any such group shall receive the internal inspection after each ten years of service. If the utility avails itself of the above exception, the holder or holders inspected shall be regularly rotated in order that eventually all holders will have been examined.

In lieu of an internal inspection, when the holder cannot be entered, a sufficient number of plugs shall be cut from, or holes bored in, the shell at points believed most subject to internal corrosion, in order that examination for corrosion can be made. The interior of at least one container of holders constructed entirely of pipe and fittings shall be inspected by removing the end closures and entering the container.

As an alternative to entering the container, or to cutting plugs or boring holes in the vessel or holder, a nondestructive test procedure such as ultrasonic testing may be used. The test instrument must be calibrated to measure the wall thickness of the steel plates so that the error of indication shall not vary more than plus or minus two thousandths ($\pm$ 0.002) of an inch.

Details of what shall constitute these inspections will be found set forth in the inspection forms prescribed by the Commission. The person or persons making such inspections shall submit a complete report of the condition of each holder to the company and at the same time forward a copy to the Commission. When such holders as are inspected are found to be in a defective and hazardous condition they shall be taken out of service until repaired and placed in a safe workable condition, and all others in the same group shall immediately be inspected and repaired if found necessary. If any portion of the shell of a high pressure holder is located underground and

exposed to the soil, inspection of its exterior for soil corrosion and leaks shall be made by suitable representative excavations at the time of the inspection.

In the years that the inspections described above are made, the utility will not be required to make the regular annual general inspection.

e. High Pressure Liquid Hydrocarbon Vessels

1. The following minimum inspections shall be made and recorded:

Monthly:

Check by actual operation the working condition of all valves, regulators, and other automatic equipment, except relief valves. Observe and note indications of leaks in aboveground piping, connections, manholes, and fittings attached to vessels.

Inspect and operate drips. Determine if combustible materials are stored within ten feet of vessel, also if relief shutoff valve (if any) is locked open. Check operation and condition of safety shutoff control on vaporization heating equipment. Check liquid level gauging equipment.

Annual General Inspection:

General inspection of aboveground vessels for condition, indications of corrosion, and need of painting. Check yard for cleanliness and fencing.

The exposed piping, valves, and fittings of buried vessels shall be examined for general condition and need of painting. The utility should satisfy itself that vessels are not settling and thereby causing undue strain on the piping and fittings attached thereto. All exposed connections, manholes, and fittings on vessels, as well as all mechanical joints in all exposed piping within fifty feet of any vessel, shall be tested for leaks with soapsuds. All leaks and their disposition shall be shown on the report form. Known or suspected leaks on buried vessels, connections, and fittings shall be uncovered and repaired as soon as practicable. Hazardous leaks shall be repaired at once.

Examination shall be made of foundations and supports for all aboveground vessels to ascertain if all saddles and piers are fully supporting the vessel. Any settlement which will produce uneven and excessive strain should be corrected at once.

Check accuracy of liquid gauging equipment. Check operation of vaporizer relief devices. Inspect condition and operation of safety shutoff control on vaporization heating equipment.

Inspection for Soil Corrosion:

Where a storage vessel is underground and exposed to the soil, inspection of its exterior for soil corrosion and leaks shall be made by suitable representative excavations at least once each ten years.

Additional Inspections:

Except as hereinafter provided, after a vessel has been used for the storage of liquid hydrocarbons for a period of twenty years and at intervals not exceeding twenty years thereafter, a complete and thorough internal and external inspection shall be made and reported upon by competent outside inspectors, not regularly in the employ of the utility who are selected by the utility and are agreeable to the Commission, with the following exception: At locations where groups of two or more vessels, of the same type of materials and design, built at the same time and subjected during the interval to identical service conditions exist, no less than twenty percent, nor less than one of the vessels in any such group shall receive the internal inspection after each twenty years of service. If the utility avails itself of the above exception, the vessel or vessels inspected shall be regularly rotated in order that eventually all vessels will have been examined.

When the vessel is buried and/or cannot be entered for an internal inspection, a sufficient number of plugs shall be cut from, or holes bored in, the shell at points believed most subject to internal and/or external corrosion, in order that examination for corrosion can be made.

As an alternative to entering the container, or to cutting plugs or boring holes in the vessel or holder, a nondestructive test procedure such as ultrasonic testing may be used. The test instrument must be calibrated to measure the wall thickness of the steel plates so that the error of indication shall not vary more than plus or minus two thousandths ($\pm$ 0.002) of an inch.

Details of what shall constitute these inspections will be found set forth in the inspection forms prescribed by the Commission. The person or persons making such inspec-

tions shall submit a complete report of the condition of each vessel to the company and at the same time forward a copy to the Commission. When such vessels as are inspected are found to be in a defective and hazardous condition they shall be taken out of service until repaired and placed in a safe workable condition, and all others in the same group shall immediately be inspected and repaired if found necessary.

In the years that the inspections described above are made, the utility will not be required to make the regular annual general inspection.

6. Record of the History of the Operation and Repair of Gas Holders and Vessels

Each utility shall prepare and submit to the Commission a report, not later than January 31 of each year, detailing the construction, disposal, acquisition, or installation of any holder or vessel, as well as any change of location, appreciable repair, or remodeling of any such equipment taking place during the previous calendar year. These reports shall constitute the Commission's permanent record of all gas holders and vessels.

The effective date of this Order shall be June 1, 1952.

Approved and dated at San Francisco this 29th day of April, 1952.

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA,

By R. J. PAJALICH, *Secretary*

Revised by Resolution No. G-1498, Effective November 12, 1970.

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA,

By W. W. DUNLOP, *Secretary*