B. E. PAMPHLET NO. 22

OCTOBER, 1937

REVISED APRIL, 1949

Handling Collisions and Derailments

Involving

Explosives, Gasoline and Other Dangerous Articles

Recommended Good Practice

BUREAU OF EXPLOSIVES

Association of American Railroads

30 VESEY STREET

NEW YORK 7, N. Y.

PRINTED IN U. S. A.

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The Interstate Commerce Commission Regulations require the use of the placard illustrated below on all cars containing shipments of flammable liquids, flammable solids, oxidizing materials, corrosive liquids, poisonous liquids and solids, Class B, and compressed gases, except that cars other than tank cars containing nonflammable compressed gases (green label) are not required to be placarded.

(Reduced size)

DANGEROUS PLACARD

However, as the Commission's regulations, sec. 545 (e), provide that placards complying with previous requirements, which are on hand on the effective date of the regulations, may be used until further order of the Commission, we may expect to find cars placarded with the old designs of placards occasionally and cars so placarded must be handled in accordance with recommendations covering the commodity indicated by name on the placards.

TANK CARS

When accidents or fires occur in connection with the transportation of dangerous articles in **tank cars**, the immediate aim of those in charge is to prevent injury and loss of life, and to prevent as far as practicable property losses. To do this intelligently, it is necessary to know what materials are involved and to have some knowledge of their properties. In the handling of accidents, the methods used will depend on the immediate existing local conditions.

FLAMMABLE LIQUIDS

Par. 1. The records clearly indicate that when freight trains are involved in collisions or derailments the losses in deaths, injuries, and property damage are usually greatest when tank cars containing Flammable Liquids and placarded "Dangerous" are involved. This is due to the fact that a very large percentage of these cars contain liquids which have a flash point of 0° Fahr. or lower and all contain liquids which have a flash point of 80° Fahr. or lower. Even the smallest of these cars, once they are injured and start to lose their contents, will provide fuel sufficient to maintain a fierce fire once the leakage is ignited. The possibilities for ignition are greatest in liquids having low flash points, for the reason that the lower the flash point the greater the probability that the temperature of the liquid or the atmospheric temperature at the time the accident occurs will be materially higher than the flash point of the liquid. It is the difference between the flash point and these temperatures which determines the rate at which vapor is given off. The greater the difference the greater the amount of vapor and the greater the hazard.

Par. 2. The flash point of a liquid is the lowest temperature at which that particular liquid will give off

vapor in sufficient quantity to provide a flammable mixture with air above the surface of the liquid. It is not the liquid which burns but the vapor it gives off at all temperatures above its flash point. Hence, as gasoline has a flash point of 0° Fahr. or lower, and its shipment in tank cars constitutes a vast majority of all tank car shipments of flammable liquids, we may reasonably assume that in every freight train containing one or more tank cars placarded "Dangerous" we will have present all the elements most likely to cause a serious fire in case a tank car is injured and its contents liberated. Quite frequently when the tank shell or its appurtenances, such as the manhole cover, safety valves, or bottom outlet, are so injured as to permit leakage of contents, ignition is caused instantly by friction sparks.

Par. 3. When fire occurs immediately in a wreck, little can be done other than to—

(a) pull away any other cars that are movable.

(b) dig holes or throw up earthen dikes in the path of burning liquid to limit the fire area and thus protect other cars or adjacent property against fire damage.

(c) smother the fire on surface of liquid with sand or dirt, or wet blankets. Use a foam or carbon dioxide fire extinguisher if available. Water is not likely to quench such a fire. It is more likely to float the liquid and spread the fire.

(d) watch all tanks in the fire for the appearance of red-hot spots, which are an indication that the tensile strength of the steel at such spots is being reduced by heat to a point where it cannot hold the pressure of 25 pounds per square inch maintained in the tank by the safety valves. It is advisable to keep out of direct line

of these spots, for should they open up, a stream of liquid or burning vapor may be projected to a distance of 50 feet or so. Bursts of this kind are not common, however, but when they do occur they are sometimes erroneously described in newspaper accounts as explosions of contents. Such reports have caused railroad men, local firefighters, and others to think and fear that the contents of a tank car placarded "Dangerous" will explode if the car is surrounded by fire. Hence attempts are sometimes made to rupture or puncture in various ways the shells of tank cars involved in a fire. This is an unwarranted and dangerous procedure likely to increase rather than decrease the seriousness of the situation, because the liquid will not explode. It is only when ignition occurs after the vapor given off by the liquid has had a chance to mix with air in certain very limited proportions that an explosion of this particular vapor-air mixture will be produced. Such explosive mixtures do not exist in loaded tank cars. Once ignited, the vapor from a flammable liquid will continue to burn until the liquid is entirely consumed. Furthermore, any apertures made in a tank by rifle or machine gun bullets or ammunition of larger caliber will only serve to liberate more flammable liquid and extend the fire, besides adding the hazard of ricocheting bullets. The safety valves on tank cars are designed to limit internal pressure to about one-twelfth the designed bursting strength of the tank, provided of course the valves are not buried or so obstructed that they cannot open, in which case the internal pressure may rise to such an extent that a rupture of the tank will occur. When a tank is in such a position an effort should be made to roll it over into a position where the valves are able to function properly, if the fire has not assumed proportions which would make such an attempt dangerous.

When vapors are burning at the safety valves, do not extinguish the flame until all other fires in the wreck have been extinguished, otherwise the leakage from the valves may spread over a large area and become ignited by a fire in some other part of the wreck, thus causing a sudden violent flash of fire which may do great damage. It is safer to let the vapor burn at the valves until the car can be cooled down to a point where no more vapor will escape through the safety valves. Then the burning will stop of its own accord.

Par. 4. When fire does not occur immediately in a wreck involving placarded tank cars, the proper handling is a matter which cannot be covered with any great degree of adequacy by definite recommendations, owing to the large variety of conditions, many of which cannot be foreseen, that occur in such wrecks. Hence, we are obliged to depend to a great extent upon the experience, good judgment, and ingenuity of the railroad employes present, supplemented by the following general advice based on the fact that when fire does not occur immediately the hazards involved in handling the situation are greater than when fire does occur immediately, for the reason that vapor given off by a liquid leaking from tank cars placarded "Dangerous" will spread over a greater area than the liquid, will travel faster, especially with the wind, than the liquid will flow, cannot be confined, and will ignite upon contact with any spark or flame and burn with great rapidity, violence, and intense heat back to the liquid surface from which the vapor originated. After such a flash of fire, the vapor burns above the surface of the liquid, thus confining the hazard to a visible area.

Par. 5. The hazards which exist as long as leakage is not on fire may be guarded against as follows:

(a) Extinguish all lights and fires (lighted pipes, cigars, and cigarettes are also sources of hazard) in the vicinity of the wreckage. When lights are necessary, use only electric flashlights or electric hand lanterns and do not switch them on or off in the presence of vapor. Keep steam crane to windward and as far away as possible. When practicable, the work of handling wrecks involving tank cars should be done during daylight hours. Owing to variations as to volatility of gasoline and other flammable liquids, amount exposed, temperature, contour of ground, and direction of wind, it is impossible to fix any definite limit at which the hazard of ignition ceases. However, the records show that ignition has occurred as far away as 1500 feet from the source of leakage, and an analysis of a large number of accidents shows an average of 110 feet between source of leakage and source of ignition.

(b) Post guards and keep all spectators away. No effort or expense to accomplish this should be spared.

(c) Dig holes or trenches or throw up earthen dikes in the path of flowing liquid to restrict as much as possible the area of liquid surface from which vapor can be given off.

(d) Cover the liquid with sand, dirt, or any other available material which will serve to blanket the surface and thus reduce the rate of evaporation. The vapor of gasoline or other flammable liquids is much heavier than air and tends to form a layer along the ground and only mixes slowly with the air. The mixing with air is increased by wind. The vapor flows along the ground tending to follow the slope of the ground and settles in low places and between cars, buildings, etc. It will not drift or flow to any extent against the wind but may travel a considerable distance with the wind.

(e) Do not permit liquid to drain into sewers or water courses, since vapor arising from it may become ignited at some point far distant from the wreck and cause serious property damages. Water thus contaminated may also cause injury to livestock.

(f) Locate all leaks and stop them if possible. Wooden plugs (see Fig. 1, page 40) will be found helpful and should be a part of wrecker equipment. Should a tank car leak, due to breaking off of the bottom discharge outlet casting or its cap, leakage may be stopped, for example, by driving a tapered wooden plug into the opening, or by plugging opening with cloth or burlap pad held in place by a plank, or by raising the safety valve until all interior pressure is relieved and then removing the manhole cover and reseating the valve by manipulating the operating mechanism, as a shock sufficient to damage the bottom discharge outlet usually unseats valves of the No. 1 type. (See Fig. 2, page 41).

(g) Allow reasonable time, after stoppage of leaks and burial of liquid, for vapor to escape from wreck and vicinity before starting to clear away damaged cars or to transfer their contents. Many liquids regarded as safe to carry under ordinary conditions and transported in tank cars without the "Dangerous" placard should be treated as dangerous in handling a wreck. Hence, when using oxyacetylene torches or similar equipment developing intense heat for cutting up the wreckage, care must be exercised to avoid contact with leakage or ground saturated with same, as even such materials as lubricating oils, asphalts, and other petroleum products, vegetable oils, and animal fats, not classed as flammable, can be ignited and will burn almost as fiercely and rapidly as do flammable liquids. An empty or partially empty tank car, with or without placards, is very liable to contain a vapor-air mixture which will ignite and possibly explode.

Hence, flame lights must not be brought near openings in the tank. Many fatal accidents have resulted from using lanterns or lighted matches to examine the interior of empty tank cars or in using hot rivets to repair unsteamed tank cars, which may contain flammable vapors even when the previous lading was not of flash point below 80° F. Only incandescent electric lights should be used for this examination. Fumes in any empty tank car should be considered as injurious to a person entering it. In no case should an empty tank be entered before it has been cleaned by steaming, without wearing a hose mask of supplied air type and without having another person stationed at the manhole with a rope attached to the person entering tank. Hobnailed shoes and metal tools are liable to create sparks and should not be used inside an empty tank.

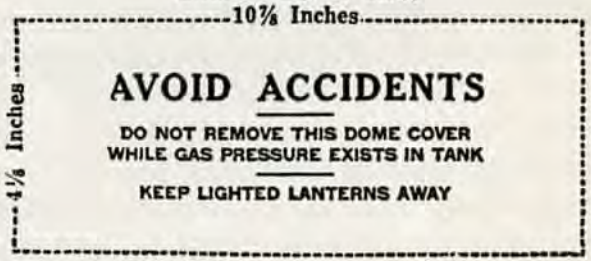
(h) Move to safety the least injured cars, avoiding sudden shocks or jars that might produce sparks or friction. No unnecessary attempt should be made to transport a damaged tank car from which flammable liquid is leaking. Safety in short movements may be secured by attaching a vessel under small leaks to prevent spread of flammable liquid over tracks. Cover tracks at intervals in rear of a moving car with fresh earth to prevent fire overtaking the car.

(i) Only as a last resort, to meet an emergency, should a wrecked car be moved by dragging, and when this is done all persons should be kept at a safe distance. When chains or wire cables are used to hoist tank cars, wooden blocks or other padding should be placed between them and the car to prevent slipping, which might produce friction sparks. When leaks are to be expected in handling, empty the car first, either by transfer of contents to other car or container or by drainage to a hole or trench in the ground for burial.

(j) Do not allow trains to pass on adjoining tracks, especially on same or lower levels, as long as liquid is leaking or exposed in quantity.

Par. 6. When it is necessary to transfer the contents of tank cars placarded "Dangerous" at the scene of the wreck, the method to be used, that is pumping or blowing with air pressure, depends on the location of the wrecked car, its condition, and the nature of its contents. If the tank is leaking, air pressure cannot be used safely or efficiently. If the liquid to be transferred is casing-head gasoline or any liquid which has a vapor pressure in excess of 16 pounds per square inch, absolute, at 100° Fahr., as indicated by the placards or stenciling on the dome reading as follows:

DOME PLACARD
(Reduced Size)
(Black printing on white)



it cannot be transferred by an ordinary vacuum pump unless the pump is so located that the liquid will flow by gravity to the pump. If the pump cannot be so located or air pressure cannot be used because of the leaking condition of the tank or a vacuum pump will not lift the liquid, leakage should be caught in drums or barrels, if available, or allowed to drain into deep holes or trenches dug in the ground, and then when liquid has drained away the loose earth should be shoveled back. Regardless of the method used, certain preliminary operations must be performed before the necessary connections for unloading can be made—

1st—the tank must be carefully hoisted or jacked, avoiding sudden shocks or jars, into a position where the manhole cover and safety valves are above the surface of the liquid in the tank.

2nd—to minimize the possibility of static electric sparks being produced during the operation of transferring a flammable liquid from one tank car to another, it is advisable to electrically interconnect, by means of a positive and substantial metallic bond, the two tanks, the pump, and the piping used in connection with the transfer of the liquid.

3rd—one safety valve must be opened by engaging a pointed bar or a claw bar with the eyelet or knob on the top of the valve and prying downward against the outer edge of the spring case. The opening and closing of the valve at short intervals will usually release all accumulated interior gas pressure. If, however, pressure continues to exist on account of the high temperature and vapor pressure of the liquid, frequent opening of the valve will cause a dangerous amount of vapor to collect outside the car and venting must be deferred until the temperature and pressure are reduced by allowing the car to stand over night or otherwise cooling the contents.

4th—after pressure is released, manhole cover seal should be broken and cover removed as follows:

Screw type.—Cover must be loosened by placing bar between manhole cover lug and knob. After two complete turns, so that vent openings are exposed, the operation must be stopped, and if there is any sound of escaping vapor, the cover must be again screwed down tightly and interior pressure relieved as prescribed above before again attempting to remove the cover.

Hinged and bolted type.—All nuts must be unscrewed one complete turn, after which same precautions as prescribed for screw type cover must be observed.

Interior type.—All dirt and cinders must be carefully removed from around cover before yoke is unscrewed.

When car is unloaded through bottom outlet valve, manhole cover must be adjusted as follows:

Screw type.—Manhole cover must be put in place but not entirely screwed down, in order that air may enter tank through vent holes in threaded flange of cover.

Hinged and bolted type.—A small wooden block should be placed under one edge of cover.

Interior type.—Screw must be tightened up in yoke so that cover will be brought up within one-half inch of closed position.

5th—having removed the manhole cover to reach the bottom outlet valve operating mechanism (see Fig. 2, page 41) in case the tank is to be unloaded through the bottom, or to insert an unloading pipe or hose if the tank is to be unloaded through the top, it is essential that before attempting to make connections to the bottom discharge outlet, the valve control should be manipulated to determine that the valve in the bottom of the tank is tightly closed. Then cautiously loosen the bottom outlet cap. If cap or reducer does not unscrew easily, it must be tapped lightly with mallet or wooden block in an upward direction. If leakage shows upon loosening the cap or reducer it must not be entirely unscrewed, but sufficient threads must be left engaged and sufficient time allowed to permit escape of any accumulation of liquid in the outlet chamber, using a pail to catch this leakage. If the leakage is in excess of a gallon and a half or so, and continues at its original rate of flow, it will indicate that the valve in the car is not tightly closed. The cap should then be screwed up tight and a further attempt made to seat the valve by manipulating the operating mechanism within the dome. Then repeat the procedure of loosening the outlet cap. If leakage is continuous and

at a rapid rate, and there is noticeable pressure on cap, it will be unsafe to remove the cap and it will be necessary to screw it up tight and proceed to unload through the dome by means of a suction pump or by means of air pressure.

If upon removal of the outlet cap the outlet chamber is found to be blocked with frozen liquid or any other matter, replace cap immediately and make careful examination to determine that outlet casting has not been cracked. If the obstruction *is not frozen liquid,* the car *must* be unloaded through the dome. If the obstruction *is frozen liquid* and no crack has been found in the outlet casting, the car *may* be unloaded from the bottom *if circumstances require it,* as follows:

Before opening the valve inside the tank car, and with the outlet cap screwed on, apply steam to outside of outlet casting or wrap casting with burlap or other rags and apply hot water to melt the frozen liquid. After making certain that the frozen liquid has had opportunity to thaw, the cap should again be loosened cautiously in accordance with instructions in the preceding paragraph, and if the valve is found to be seated properly, so as to prevent leakage, the cap may be completely removed and connections made. In any event, top unloading is considered safer than bottom unloading.

An ordinary light service pump which will operate efficiently with compressed air or with steam will suffice for transferring in the majority of cases. A hand pump may also be used if no other pump is available. The same equipment may also be used when it is possible to make connection with the bottom discharge outlet of the tank. If air pressure is to be used to transfer the contents and the car is equipped with eduction pipes and vent pipes projecting through the dome head and these pipes are equipped with valves, unloading may be accomplished

without relieving internal pressure. When these pipes are closed with ordinary pipe caps, extreme care must be taken not to remove the cap on the eduction pipe or the vent pipe until all pressure has been released through the safety valves, as described in paragraph 6—3rd. When cars are not so equipped, air pressure may best be applied by means of a special manhole cover (see Fig. 3, page 42) equipped with two openings through which pipes are tightly fitted. One of these pipes should extend only a few inches inside the dome and be used for the air pressure feed. The other pipe should pass to the lowest part of the tank and act as a discharge pipe. If a special manhole cover is not available and a machine shop is, the manhole cover of the car can be prepared as above in a short time. The discharge pipe is then connected by means of other piping to the car into which the contents of the wrecked car is to be discharged. The discharge end of the pipe should extend nearly to the bottom of the empty tank to prevent agitation and to reduce evaporation losses and the manhole should be covered with wet burlap to retard the escape of vapor and prevent the entrance of sparks. This should also be done when a pump is used. The amount of air pressure to be applied should be carefully controlled by means of a reducer valve and should not be allowed to exceed 10 pounds per square inch, except under very unusual circumstances. Ten pounds or less will be found sufficient in the great majority of cases, as it will suffice to lift liquid weighing no more than water to a height of about 20 feet. If 15 pounds or less will not suffice to give the necessary lift, a pump should be used, the pump being placed near the tank to be emptied.

When liquid is pumped through the dome of a tank and no special cover or means for converting the cover of the tank is available, the manhole openings around the

suction pipe and the pipe in the empty car should be covered with wet burlap to retard the escape of vapor and prevent the entrance of sparks.

After transfer is completed, the closures of all openings on the loaded tank and on the empty tank must be properly secured in place by the use of a bar, wrench, or other suitable tool, and manhole covers and outlet valve caps must be made tight against leakage of vapor and liquid by the use of gaskets of suitable material before the cars are further transported.

The empty tank should be stenciled on both sides, in letters three inches in size, adjacent to the car number, "LEAKY TANK, DO NOT LOAD UNTIL REPAIRED," and at the location of the leak "X," and the owner immediately notified, such notification to indicate definitely location of leak.

All tools and implements used in connection with transferring should be kept free from oil, dirt, and grit.

Par. 7. Leakage of Flammable Liquids in Tunnels. (Also see par. 5.)

In the event of a derailment in a tunnel involving tank cars of flammable liquids, wherein large quantities of liquids are released, a hazard is created which exceeds that resulting from derailment of tank cars in open areas, due to the fact that vapors from the liquid are not readily dissipated.

When derailments occur conditions will undoubtedly vary with each instance, depending upon the condition of the tunnel with regard to drainage and ventilation; the length of the tunnel, and whether or not derailment occurs near the portals of the tunnel or at an intermediate point; and the equipment available. In any event it will be well to observe the following precautions:

(a)—If fire **occurs** at time of derailment:

1st—Remove valuable property insofar as possible without unnecessary risk of life.

2nd—Fight fire with foam extinguishers, carbon dioxide, or steam. Do not use water on the fire as it will spread the flames.

Caution: A large fire in a partly enclosed place may exhaust the air supply so rapidly as to endanger the lives of fire fighting crews.

(b)—If fire **does not occur** at time of derailment, close attention must be given to the risk to humans, resulting from suffocation by vapors, and the fire and explosion hazard due to the presence of these vapors in the air in the tunnel. Gas masks equipped with self contained breathing units must be used, as ordinary gas masks equipped only with a filtering device are not designed for service in areas where insufficient oxygen is available:

1st—Remove all probable sources of ignition as soon as possible (cut off power if railway is electrified) and keep unauthorized persons away.

2nd—Approach the wreckage from the windward end if possible. (Most flammable liquids have characteristic odors, and the presence of vapors can thus be readily detected.) Only one person should enter an area where vapors are concentrated, and means should be provided to extricate him if overcome.

Caution: Persons will be overcome if allowed to remain in areas where vapors have accumulated. It is dangerous to send a crew of men into a tunnel to remove wreckage until it has been established that the area is safe for operations.

3rd—When conditions permit absorb spilled liquid with sand or earth and use embankments to keep the exposed surface of liquid as small as possible. If liquid

can be drained from the tunnel by natural means, or by pumping, it should be removed. If foam fire extinguishing equipment is available, exposed surfaces of liquid may be blanketed with foam, thus reducing the vaporization. As foam tends to dissolve, more foam must be added at intervals.

Note: Sand or earth that has been used to absorb liquid must be wet with water during operations for removal of the sand, to avoid sparks which might ignite the vapors. Such sand should not be removed until necessary clearance of wreckage has been accomplished.

CORROSIVE AND POISONOUS LIQUIDS

Par. 8. In case of a wreck involving cars bearing "Dangerous" placards and there is leakage of the contents of such cars, the following recommendations and those contained in paragraph 14 apply generally:

(a) Post guards and keep all spectators away from leakage.

(b) Dig holes or throw up earthen dikes to prevent the leakage from spreading. After the leakage has been absorbed, fill holes and cover adjacent saturated soil with fresh earth and wash off any spillage that may be on the exterior surface of the car with a liberal supply of water.

(c) Avoid contact with contents or inhalation of fumes.

(d) Corrosive liquids when in contact with the body may cause serious or fatal burns. If corrosive liquids or poisonous liquids come in contact with the body, water should be applied immediately and freely to wash away these materials. In case they can be washed off quickly enough, all injury may be prevented. When handling or transferring them, a supply of water should be kept at

hand sufficient to prevent injury in case of splashes or spills.

(e) While corrosive liquids generally will cause personal injuries and damages to other material through contact, most of them will not cause fire by contact with other merchandise. Nitric acid, mixed acid, perchloric acid, or hydrogen peroxide may cause fire when brought in contact with combustible materials. When fires are caused by acids or corrosive liquids they are best extinguished by the use of a large amount of water. Water should be used in sufficient quantity to extinguish the fire and also to dilute and wash away the liquid. Contact of the water with acid may cause slight explosions and projection of acid. Consequently care should be taken to throw a stream of water on the fire from a reasonably safe distance. The reddish fumes caused by fires from nitric acid and mixed acids are irritating and also poisonous. Care should be taken that men are not exposed to such fumes, so as to inhale them to a dangerous degree.

(f) Should it be necessary to transfer the contents of such cars, call upon the shipper or the nearest manufacturer of these liquids for assistance.

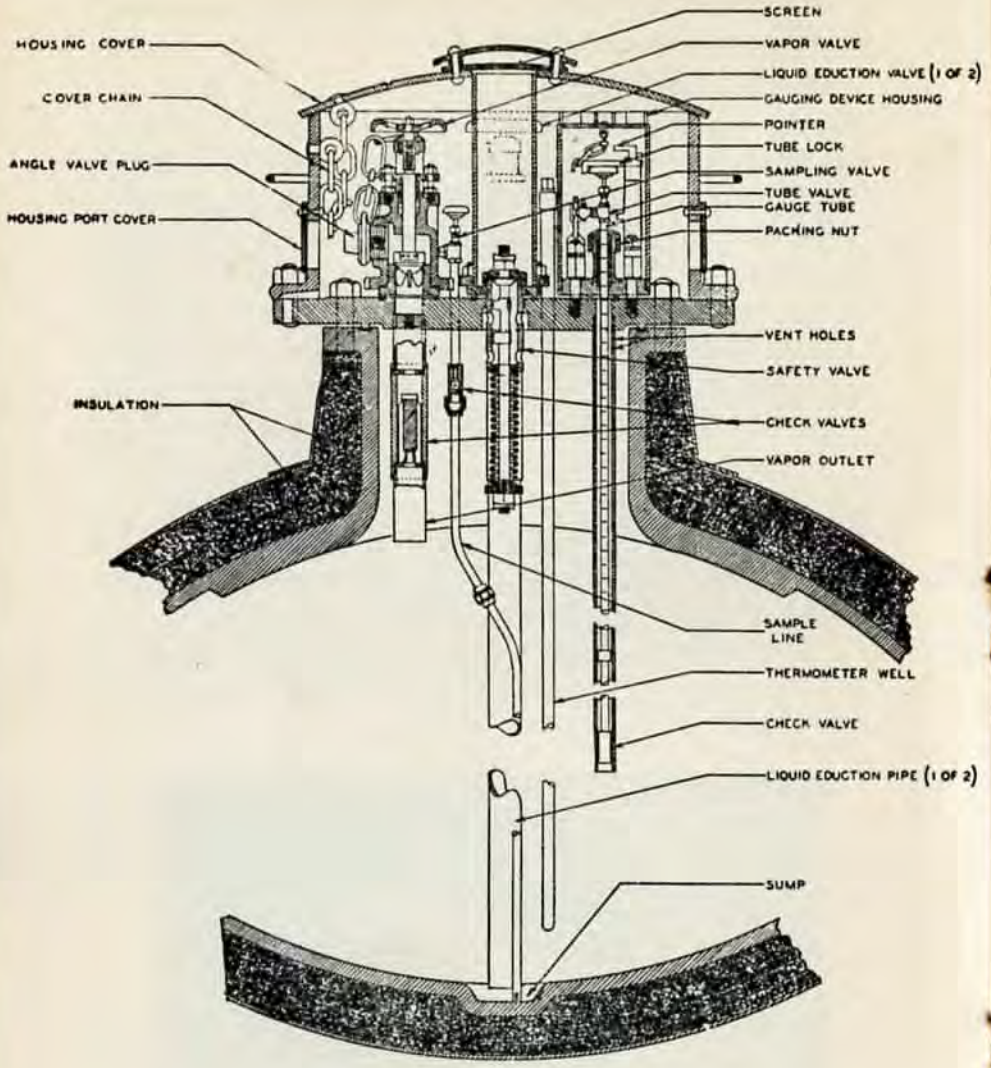
LIQUEFIED COMPRESSED GASES

Par. 9. To date only a few cars such as are authorized for the shipment of liquefied compressed gases, namely cars stenciled ARA-V, ICC-104A, ICC-104A-W, ICC-105, ICC-105A ICC-105A-W, and ICC-106A, have been involved in wrecks and they have not been seriously injured, possibly for the reason that they are of superior construction and so designed as to prevent injuries of the type which most frequently cause leakage from tank cars of ordinary design such as are used for the transportation of flammable, corrosive, and poisonous liquids.

In case of a wreck involving shipments of liquefied compressed gases in tank cars the following recommendations apply generally:

(a) If the car bears the "Dangerous" placards prescribed for flammable compressed gases, such as Liquefied Petroleum Gas, Hydrogen, Methyl Chloride, etc., as indicated by the commodity name shown on the placards, call upon the shipper or the nearest manufacturer of the gas for assistance. The hazards from leakage are similar to those which attend the leakage of gasoline, except that the liquefied portion of the gas upon release from the car evaporates with great rapidity and pools of liquid do not usually form but the gas is easily ignited and will burn rapidly. If mixed with the right amount of air, it will explode. Keep to the windward of cars that are leaking. See instructions for flammable liquids, paragraphs 3(a) and (d), 4, and 5(a), (b), and (j).

The following illustrations show the parts of tank cars used for the transportation of liquefied petroleum gases which are most likely to leak:



Bearing in mind that when these cars are properly loaded the level of the liquefied gas in the tank is considerably below the bottom of the manhole nozzle, the space above the liquid being filled with vapor, it should be easy

to understand that vapor will be liberated if the following fittings are loose or defective:

1. The gasketed joint between the manhole cover and the manhole nozzle;

2. The vapor valve and the gasketed joint between its base and the manhole cover;

3. The gasket of the safety valve and the gasketed joint between the base of the valve and the manhole cover; and

4. The gasketed joint between the base of the gauging device and the manhole cover and the stuffing box through which the gauge tube passes.

Leakage at these points may be stopped by tightening the nuts on the bolts which secure these fittings in place, the plugs, and the stuffing boxes, or turning the handle of the vapor valve to a tight position.

These fittings form closures of openings above the level of the liquid in the tank. Hence leakage is vapor.

Liquid will be liberated if the following fittings are loose or defective:

1. The eduction valves, the gasketed joints between the bases of these valves and the manhole cover, and the valve stuffing boxes;

2. The sampling valve; and

3. The valves or cocks on the upper end of the gauge tube.

These fittings form closures of tubes or pipes which extend below the level of the liquid in the tank. Hence leakage is liquid, forced out by internal pressure.

Leakage at these points may be stopped by tightening the nuts on the bolts which secure these fittings in place, the plugs, and the stuffing boxes of the eduction valves, or turning the handles of the eduction valves, sampling valve, and gauge tube valve to a tight position,

or screwing down the gauging device housing tightly on a good gasket.

Referring to first illustration note that two of the valves are mounted on the longitudinal center line of the manhole cover. These are the liquid eduction valves and they are of the same design as the vapor valve. The pipes under the eduction valves are equipped with check valves (excess flow valves), the same as shown under the vapor valve in the second illustration. These check valves, as well as those shown at the bottom of the gauge tube and in the sample line, are designed to close automatically when their external closures on the manhole cover are broken off or fully opened.

Should a leak occur in the tank shell, isolate the car, keep lights and fires away, and immediately call upon the shipper or consignee for assistance in disposing of or transferring the contents.

PRECAUTIONS—Isolate the car. Keep lights and fires away. Keep spectators away. Approach leakage from windward side. Handle carefully the housing cover, gauging device housing, and any wrenches or other tools used for tightening nuts, so as to avoid production of friction sparks. All tools should be kept free of oil, dirt, and grit.

(b) If the car bears the "Dangerous" placards prescribed for shipments of non-flammable compressed gases, such as anhydrous ammonia, chlorine, sulphur dioxide, etc., as indicated by the commodity name shown on the placards, call upon the shipper or the nearest manufacturer of the gas for assistance. Owing to the poisonous and irritating nature of these gases all persons in the vicinity of the leaking tank car should be kept to the windward side of the leak. All persons in the path of the fumes should be warned to move to a safer location, preferably at an elevation considerably above the leaking container. The leaking container should, if possible, be moved to a point where escaping vapor will be carried by the wind away from occupied buildings or locations.

(c) If the wreckage is on fire, the heat of the fire will tend to vaporize the leakage and carry its fumes upward. If the car is not leaking, every effort should be made to extinguish the fire or to move the tank car away from it.

(d) The tanks of cars stenciled ARA-V, ICC-104A, ICC-104A-W, ICC-105, ICC-105A and ICC-105A-W are insulated and equipped with safety valves for retarding changes in the temperature of the lading and preventing an interior pressure beyond that for which the tanks are designed.

(e) Cars stenciled ICC-106A are of the multi-unit type, the tanks of which are detachable from the car. They are not insulated and, except for those used for Class A poison gases, are equipped with fusible plugs located in each end of each tank. If these tanks are not leaking and are endangered by fire every effort should be made to extinguish the fire around them or to move the tanks away from it, before the fusible plugs melt. If tanks are leaking, the fire will tend to vaporize the leakage and carry its fumes upward. In clearing a wreck involving these tanks flame torches or other sources of heat must be kept away from the fusible plugs, otherwise they will melt and liberate the contents.

(f) If these tanks are leaking, no person should be allowed to enter the gas area without being equipped with a gas mask of a design approved by the U. S. Bureau of Mines for protection against the particular gas involved. Persons delegated to use gas masks must be qualified and experienced in their use.

At least two men should always be equipped with masks at the same time, the second man holding himself

in position to be of assistance to the first man in case of emergency, such as mask being torn, development of leak, or injury due to tripping or being struck by some falling object.

First Aid—Any person affected by the gas should be removed from the gas area and placed on back with head and back elevated. Call a physician. If clothing is saturated with the gas, it should be removed to prevent skin irritation and burns. Keep patient warm and quiet. If breathing has apparently ceased, start immediately the prone pressure method of resuscitation (Shafer) and do not exceed 18 movements per minute.

If there is leakage of liquid or gas from a multi-unit-tank car bearing "Poison Gas" placards and the liquid or vapors have not been ignited all persons must be warned to stay away from areas where the vapors may accumulate. In such cases immediate assistance should be secured from the shipper or consignee. If qualified persons equipped with gas masks are available to do so attempts to plug the leak, or reduce the amount of leakage by use of wooden plugs may be made but every precaution must be taken to keep leaking liquid from contact with the skin. Cooling of the tank with streams of water will be effective in reducing pressure and consequent rate of leakage, and if it is possible to roll the tank so point of leakage is at the top the hazard may be reduced considerably.

If there is leakage of liquid or gas from a tank car of *chlorine* or *sulfur dioxide* precautions similar to those above should be observed although the hazard is somewhat less.

If it is possible to move a leaking unit from a multi-unit-tank car to a pond or body of water of sufficient size to completely submerge the unit, the hazard can be reduced by doing so. Small streams running through pas-

ture lands should not be used for this purpose due to the danger of poisoning cattle. Whenever possible shippers should be called upon to assist in handling as they have equipment for repairing small leaks such as are most liable to occur.

Par. 10. The transfer of liquefied compressed gases should not be attempted by carriers' employes as this operation calls for special equipment and procedure which may only be provided and recommended by the shipper of the car or the nearest manufacturer of the gas involved (whose name may be obtained from the Bureau of Explosives), who should be immediately advised of the conditions existing and called upon for assistance.

CARS OTHER THAN TANK CARS

For the handling of fires and accidents involving shipments of explosives and other dangerous articles other than liquids and gases in tank cars the following general information is furnished with a view to enabling persons charged with the responsibility of handling the situation to adopt the most practicable and effective action applicable to the existing local conditions.

EXPLOSIVES

Par. 11. (a) In case explosion happens as immediate result of accident, the only thing that can be done is to care for any injured, and to prevent if possible the spread of fire sometimes caused by explosions.

(b) In case fire has started near the explosives, every effort should be made to put out the fire, or to remove the explosive to a safer place. Some explosives explode immediately on ignition, others may burn for some time before exploding, or may even be completely consumed without any explosion. Owing to the extreme

likelihood of the detonation of burning explosives, efforts to extinguish such fires are not warranted. Moreover, the application of water to such material when burning may precipitate an explosion. All efforts should be made to get everyone at a safe distance before explosion.

(c) In case the accident does not cause the immediate ignition or explosion of the explosive, the first and most important precaution is to prevent fire. The locality should be guarded to keep away all unauthorized persons. Before beginning to clear a wreck in which a car containing explosives is involved, all unbroken packages should be removed to a place of safety and as much of the broken packages and contents as possible gathered up and likewise removed for destruction or repacking as their condition may warrant, and the rest saturated with water. Many explosives are readily fired by a blow or by the spark produced when two pieces of metal or a piece of metal and stone come violently together. In clearing a wreck, therefore, care must be taken not to strike fire with tools, and in using the crane or locomotive to tear the wreckage in pieces the possibility of producing sparks must be considered. With most explosives thorough wetting with water practically removes all danger of explosion by spark or blow; but with the dynamites, wetting does not make them safe from blows. With all explosives, mixing with earth renders them safer from either fire, spark, or blow. In case fulminate has been scattered by a wreck, after the wreck has been cleared, the wet surface of the ground should be removed, and, after saturating the area with fuel or lubricating oil, be replaced by fresh earth. If this is not done, when the ground and fulminate become dry small explosions may occur when the mixed material is trodden on or struck.

In case of a wreck involving a car containing chemical ammunition, every precaution must be taken to pre-

vent fire and to prevent casualties due to gas leakage. Only those persons necessary to clear the wreckage shall be allowed in the vicinity of the wreck, and they should be cautioned to keep as much as possible on the side from which the wind is blowing.

In handling packages of explosives and in transferring them to and from cars, the greatest care must be taken, and shocks or falls liable to injure the containers must be avoided.

When chutes are used to handle packages of dynamite, they should be occasionally wiped down with waste moistened with machine oil.

A stuffed mattress or a thick pad of any available material should be placed under the discharging end of the chute.

The chute and the shoes of the men handling the packages must be as free as possible from grit, and all possible precautions must be taken against fire.

Packages of explosives found injured or broken may be recoopered when this is evidently practicable and not dangerous. A broken box of high explosives that cannot be recoopered should be reinforced by stout wrapping paper and twine, placed in another strong box and surrounded by dry, fine sawdust or dry and clean cotton waste or elastic wads made from dry newspapers. A ruptured can or keg should be inclosed in a grain bag of good quality and boxed. Injured packages thus protected and properly marked may be forwarded. The box and waybill should be marked to indicate that it has been repacked.

Particles of explosive compositions from damaged containers possibly may be strewn on car floors or freight, and due care should be exercised in repacking such containers that no sparks may be produced by con-

tact of metal or other hard surfaces, or otherwise. Water will prevent the explosion of practically all explosive substances except dynamite, and in such cases car floors should be thoroughly swept, and washed with a plentiful supply of water. Use of iron-wheel trucks, metal hammers, or other metal tools, should be avoided.

Packages of explosives showing evidence of leakage of liquid ingredients must be disposed of to a person who is competent and willing to remove them from railway property.

When disposition cannot be made as above, the leaking boxes must be packed in other boxes large enough to permit inclosure, and the leaking boxes must be surrounded by at least 2 inches of dry, fine sawdust or dry and clean cotton waste, and be stored in a safe place until arrival of an inspector of the Bureau of Explosives, or other authorized person, to superintend the destruction or disposition of the condemned material.

Whenever a car placarded "Explosives" is opened after such a car has received rough treatment, inspection must be made of the packages of explosives as soon as practicable without unnecessary disturbance of lading, to see that they are properly loaded and stayed and in good condition. Upon the discovery of leaking or broken packages they must be carefully removed to a safe place. Loose powder or other explosives must be swept up and carefully removed. If the floor is wet with nitroglycerin the car is unsafe to use, and a representative of the Bureau of Explosives should be immediately called to superintend the thorough mopping and washing of the floor with a warm, saturated solution of concentrated lye or sodium carbonate. If necessary, the car must be placed on an isolated siding and proper notice given.

In a car containing explosives, all other freight must be so loaded, and if necessary so braced and stayed, as

to prevent injury to packages of explosives during transit.

FLAMMABLE LIQUIDS

Par. 12. In case of a wreck involving a car containing packages of flammable freight, it should be assumed that packages are broken and that leakage has occurred which may cause fire if lighted lanterns or other flames are taken into or near these cars. The presence of vapors will generally be indicated by characteristic odors. As much of the train as possible should be removed to a place of safety. A box car containing flammable freight should be opened for ventilation and packages protected by red labels should be carefully removed to a safe place. When leakage is continuous ventilation will not remove the danger. Flammable liquids spilled from broken packages should be well covered with dry earth before a lighted lantern, torch or an engine is used in the vicinity.

Unless they are leaking, or in a manifestly insecure condition, packages of dangerous articles other than explosives in transit must be forwarded to destination and report made of any violation observed. Leaking packages must not be forwarded.

FLAMMABLE SOLIDS AND OXIDIZING MATERIALS

Par. 13. (a) Fire in shipments of "strike anywhere" matches frequently is caused by the ignition of the match heads in one or more of the inner cartons. If the outer box is not broken or opened, the fire is generally confined to these cartons, and after the head composition of the matches is consumed, the fire goes out. If the outside box is not broken, and the smoke dies away after a few minutes, no further action is necessary, as the fire has already been extinguished by lack of air, and nothing

will be gained by opening the box. If the fire has gained some headway, the burning box or boxes should be removed from the car or warehouse if possible, or water should be freely used. Boxes should not be broken open any more than necessary as the fire will be increased by such action.

(b) When fire occurs in charcoal in transit, water should not be used if it is practicable to locate and remove the material on fire, since wet charcoal is much more liable to ignite spontaneously, and the fire cannot be stopped permanently by the use of water.

(c) Fires in ground charcoal or in charcoal screenings are best handled by removing the burning packages. If this is not practicable, water should be used sparingly to extinguish the visible fire; then remove all the charcoal and separate the wet from the dry material. The dry charcoal should be stored under cover in a dry place, and held under observation for at least five days, before further shipment, as fire is likely to start again. The wet charcoal should be destroyed as it is unsafe for transportation, and is generally of little value after being wet. Fires in lump charcoal should be extinguished with as little water as possible, and the wet charcoal should be removed from the balance of the lading. The dry material should be kept several days under observation before reshipment.

(d) Fires in sulphur are best extinguished with water, or if discovered at the start, the burning portion may be removed. Sulphur does not burn rapidly nor will the fire spread rapidly. After a fire is apparently extinguished, the shipment should be kept under observation as, owing to the low ignition temperature, fire may break out again. The fumes from burning sulphur are suffocating and should be avoided.

(e) Nitrate of soda alone will not burn but when intimately mixed with organic matter such as jute bagging, will burn strongly if ignited. The heat of burning melts the nitrate of soda which causes rapid spread of fire, as this fused material ignites any combustible matter which it touches. Melted nitrate of soda holds a great deal of heat, and when water is thrown upon it the sudden generation of steam will cause the melted nitrate to scatter and start fresh fire. Whenever practicable, fires in nitrate of soda shipments should be smothered immediately with earth or sand, or water may be used if fire is still of slight extent. The use of water on a large nitrate of soda fire is seldom effective.

(f) In wrecks involving chlorates, flammable solids, or other oxidizing materials in packages bearing yellow labels, care is necessary to prevent ignition of these articles through friction or contact with shipments of acids. When chlorates are mixed with organic matter, including dust, dirt, etc., they form very flammable mixtures and often act in the same manner as high explosives when they are mixed with finely divided combustible material. Chlorates, when in contact with sulphuric acid, are liable to cause fire or explosion.

CORROSIVE LIQUIDS

Par. 14. (a) Whenever a car bearing the "Dangerous" placard is discovered in transit with packages in leaking condition, all unnecessary movement of the car must cease and at the first opportunity an examination must be made of the lading, and if practicable any broken or leaking packages of nitric or mixed acids should be removed promptly to prevent fire. Any acid or other corrosive liquid remaining on the car floor or on surrounding packages should be washed away with a plentiful supply of water, or if not available, cleaned up with a liberal

application of sand or earth. Care should be exercised to prevent inhalation of gases liberated through the application of water; when employes are injured by acid or other corrosive liquid, the liquid should be washed off immediately by a liberal application of water.

(b) Acid or other corrosive-liquid carboys should be handled so as not to spill the contents. "Empty" carboys, so called, should be handled with necks up, and with sufficient care to prevent burns to clothing or person from leaking acid or other corrosive liquid.

(c) Fire may be caused by the leakage of nitric acid, perchloric acid or bromine. These materials are very corrosive, and give off irritating and poisonous fumes. If fire is started, it should be extinguished by water. Fumes of bromine may be neutralized by using ammonia water or "household ammonia" sprayed through a sprinkler or watering pot. Sufficient ammonia should be sprinkled to counteract the bromine fumes and the broken packages can then be removed.

For further information in regard to corrosive liquids see par. 8.

COMPRESSED GASES

Par. 15. (a) Cylinders of compressed or liquefied gases occasionally develop leaks in transit. Generally it is difficult to stop these leaks, except where gas escapes through a valve accidentally open, and attempts to do so are often dangerous. If the cylinder contains a flammable gas, care should be taken to remove it to an open space at a distance from lights or fires. It should be left in this location until the contents have escaped. If a cylinder containing ammonia, chlorine, or sulphur dioxide gas is leaking, efforts should be made to remove the leaking cylinder to an isolated place or to submerge it in any

nearby body of water that is not for consumption by humans or stock, as these gases have a very irritating odor and when inhaled may cause serious injury or death. Gas cylinders, with few exceptions, are provided with safety devices to prevent rupture in case they are exposed to severe heat or fire. In spite of these safety devices the cylinders occasionally burst when in fires, throwing pieces of the cylinder for a distance of several hundred yards. Where fire is known to be in the immediate vicinity of compressed gas cylinders of any kind, all unauthorized persons should be kept at a safe distance.

(b) Cylinders of compressed gases which are not leaking should be removed from the wreck, if possible, and care must be taken to prevent their being dropped or struck sharply.

POISONS—Class A, B, and C.

Par. 16. (a) The most important precaution in handling leaking or damaged packages of poisons, or in clearing wrecks involving same, is to avoid actual body contact with contents or inhalation of the gas or vapor. The fumes of gases shipped in cylinders or cases bearing the "Poison Gas" label are deadly. A very small proportion of the gas or vapor mixed with air may be dangerous to life. Often their leakage is not noticeable and the escaping gas can neither be seen nor smelled. Extreme care is necessary in handling cylinders containing these gases and the shipper or the nearest manufacturer of the gas should be called upon to assist in clearing any wreck attended by serious leakage of these gases.

Cylinders protected by "Poison Gas" labels are subject to explosion through shock or heat in the same manner as cylinders of other gases, and the general precautions outlined for compressed gases should be observed.

(b) Poisonous liquids, Class B, bearing the "Poison" label are chiefly dangerous by direct contact with the body or by contamination of foods and feeds. Thorough washing of the hands after handling poisons is necessary. The vapors of some liquid poisons are also offensive or dangerous, but to a much less extent than the gases or liquids requiring the "Poison Gas" label.

There are also poisonous solids, Class B, bearing the "Poison" label, of such a nature that they are chiefly dangerous if taken internally, although having some poisonous effects on the skin. Spilled materials of this kind should be carefully removed and advice as to disposition secured from the shipper or the Bureau of Explosives.

(c) Cars which have contained arsenic, arsenate of lead, sodium arsenate, calcium arsenate, Paris green, calcium cyanide, potassium cyanide, sodium cyanide, or other poisonous articles, which show any evidence of leakage from packages, must be thoroughly cleaned after unloading before cars are again placed in service.

(d) Tear gas, Class C, includes tear gas producing materials of various kinds. They are of such nature that persons will not remain in an area contaminated by them unless escape is impossible. Those which are shipped in the form of liquids or gases might delay the clearance of wreckage, in the event of leakage, but are not otherwise particularly hazardous.

Leaking or broken packages may be approached with safety from the windward side for the purpose of moving them out of the way provided there is a brisk breeze to carry away the fumes and the broken or leaking package is not in a confined space.

Par. 17. POISONS CLASS D (Radioactive Material). The Interstate Commerce Commission's regulations provide for the shipment of radioactive ores, resi-

dues and similar materials of relatively low activity, in carload lots via rail freight. There also is occasional need for the shipment of such material in less-than-carload lots. There are also instances when it is necessary to ship material of slightly higher activity than specifically provided for in the regulations, and these shipments as well as less-than-carload shipments must be made by special arrangements with the Bureau of Explosives. In making arrangements for shipments having greater radioactivity than is normally provided for in the regulations, the Bureau of Explosives can learn of any circumstance which may result in unusual delay to the shipment and thus avoid the hazards attendant upon the transportation of this commodity.

Cars containing radioactive materials which may be transported via rail freight must bear the Dangerous Class D Poison placard as shown herein (see page 44) and in addition may bear placards showing the name and address of the shipper, together with other information which might be helpful in handling the material in the event it is involved in an accident.

Should any carload shipments of ores, residues, or similar materials become involved in a collision, derailment or other serious accident which necessitates transfer of the lading or the handling of the material for any reason, the following precautions should be observed:

1. The Bureau of Explosives must be contacted immediately by wire or telephone, either through the district inspector or the headquarters' office at 30 Vesey Street, New York City.
2. The shipper, if known, should be notified at once.
3. Insofar as possible, the material should be isolated from danger of fire, for while most of these materials are not flammable, fire involving the shipment would complicate decontamination procedure.

4. Every reasonable precaution should be taken to prevent personnel from coming in direct contact with any of the spilled material or from having their wearing apparel contaminated with it.

5. No person should remain close to the material unnecessarily. No employe should work around or handle such lading more than eight hours out of any twenty-four hour period or more than two hours consecutively, unless a qualified representative of the shipper or the Bureau of Explosives advises that it is safe to do so.

6. If containers are intact (not damaged so as to expose contents), they may be handled by hand or mechanical hoist, provided that no persons actually handling the drums are close to the drums for more than about two hours at a time. The containers should be isolated about 50 feet from occupied areas.

7. If containers are broken open and contents exposed, employes handling the lading must wear coveralls and gloves and should avoid inhaling dust from the lading. Spilled material should be moderately sprinkled with water to reduce the dust before handling.

8. Shovels should be used to remove spilled material and spilled material should be placed in any available container which can be removed from an occupied area.

9. If containers are not available, spilled material may be shoveled into a pile 50 feet from the nearest occupied area and covered with a tarpaulin to prevent spread of the material by wind, rain or storm, until such time as suitable containers can be obtained. Containers must be obtained as promptly as possible in such cases.

10. When handling is completed, men handling the material should leave shovels, overalls, gloves or any apparel which has been contaminated at the same isolated location where the salvaged material has been stored.

11. Personnel should, after handling spilled material, wash thoroughly with soap and water.

12. Precautions should be taken to prevent any persons from loitering near the material needlessly or carrying it away.

In order that the foregoing instructions may be properly understood, some understanding of the characteristics of these radioactive ores and residues is necessary. It should be borne in mind that where radioactive materials are concerned, there is always a certain amount of radiation "escaping" from the material. An actual break in the container is not necessary to permit the escape of this radiation, nor will the container of itself afford any great amount of shielding against the radiation. The so-called gamma rays which constitute a large part of the hazardous radiation escaping from the type of materials which are handled via rail freight do not differ appreciably from the x-rays which are so widely used because of their penetrating characteristics. Like many poisonous materials, these rays can be beneficial to mankind when properly controlled and utilized but an overdose may cause injury. It is to completely eliminate the possibility of an overdose that the foregoing precautions are prescribed for the handling of the material, and if the precautions are followed the total daily exposure to any individual will be much less than 1% of the exposure received by a patient being fluoroscoped.

The rays from these materials have many of the characteristics of ordinary light rays such as are produced by an electric light. It is possible to burn one's hand by placing it on a lighted 100 watt light bulb and allowing it to remain there for more than a few seconds, and yet at a distance of a few inches the warmth is barely noticeable and at a distance of two feet it cannot be felt

at all. If a person were to remain in the midst of a shipment of radioactive ore for a long period of time, he might suffer ill effects, even though those ill effects might not be immediately noticeable. On the other hand, if he were to remain at a distance of 50 feet from a carload of the same ore, he could do so for the remainder of his natural lifetime without harm. The amount of radiation close to the source is many times the amount of radiation even at a relatively short distance from the source, and that factor must always be taken into consideration when handling these materials.

Radioactive materials also have another peculiar characteristic in that insofar as the hazard is concerned, they cannot be destroyed by burning or by neutralizing with other chemicals even though they can readily be removed to a safe distance. Fire will change the appearance and the chemical composition of many radioactive substances, but the changed material is just as radioactive as it was before it was affected by the fire and the hazard still remains. For that reason railroad cars or any equipment or items of clothing which have been contaminated with the material must not be placed in service until the Bureau of Explosives advises that they have been decontaminated.

The penetrating rays from radioactive materials, as has been explained previously, can and do penetrate all ordinary materials although some materials are penetrated less readily than others. Even lead, which is one of the most effective shielding materials that can be used with any degree of economy, does not provide a perfect shield against gamma radiation. If a piece of unexposed photographic film were placed near a radioactive substance, it would become "exposed" even in total darkness, and if a shipment of film were placed in a strong radio-

active field, all of the film in that shipment would be likely to be exposed and its usefulness destroyed. For that reason, cars containing film should not be left near cars of radioactive material for any appreciable length of time nor should they be coupled to such cars in trains. The I.C.C. regulations provide a factor of safety which will protect film under conditions normally incident to transportation, but special precautions should be taken to separate unexposed film and radioactive materials under unusual conditions such as might exist in the event of a collision, derailment or other serious accident. For that reason, cars containing general merchandise, unless it is known that there is no unexposed film contained in the car, should not be left coupled to or on a track next to a car of radioactive material. A distance of 100 feet is adequate to protect the film under any but the most unusual conditions.

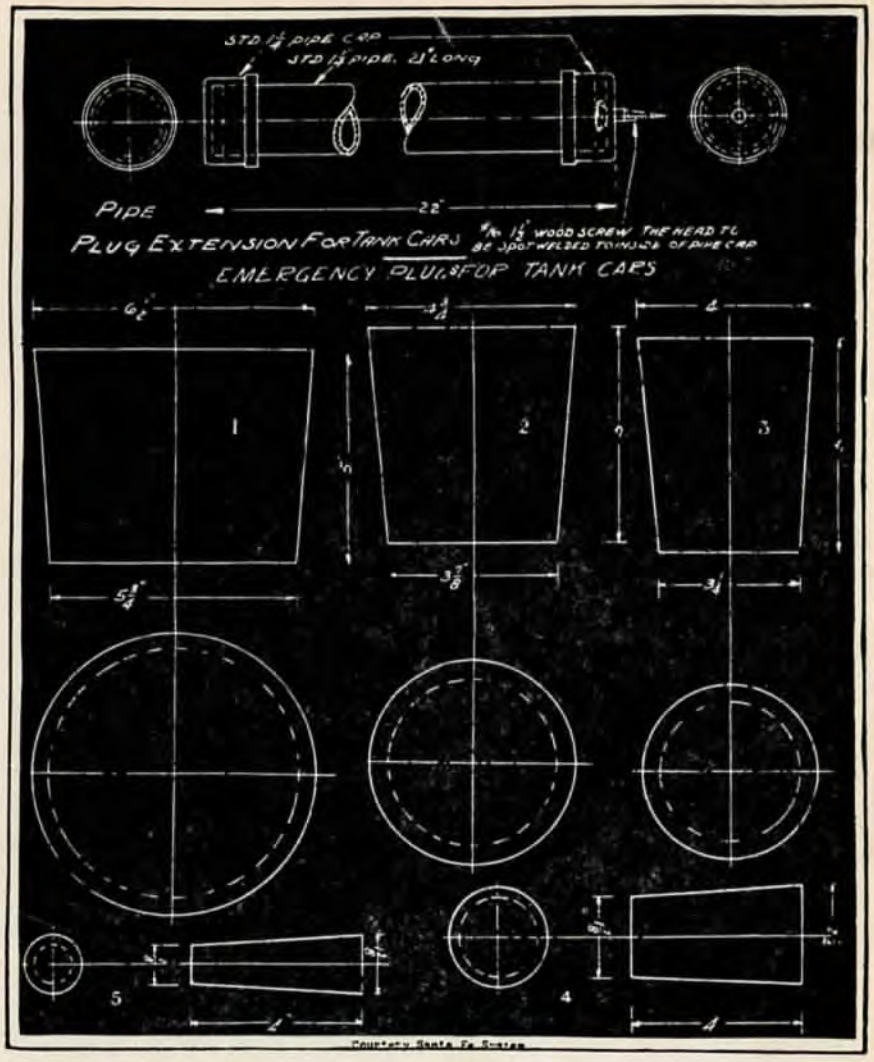
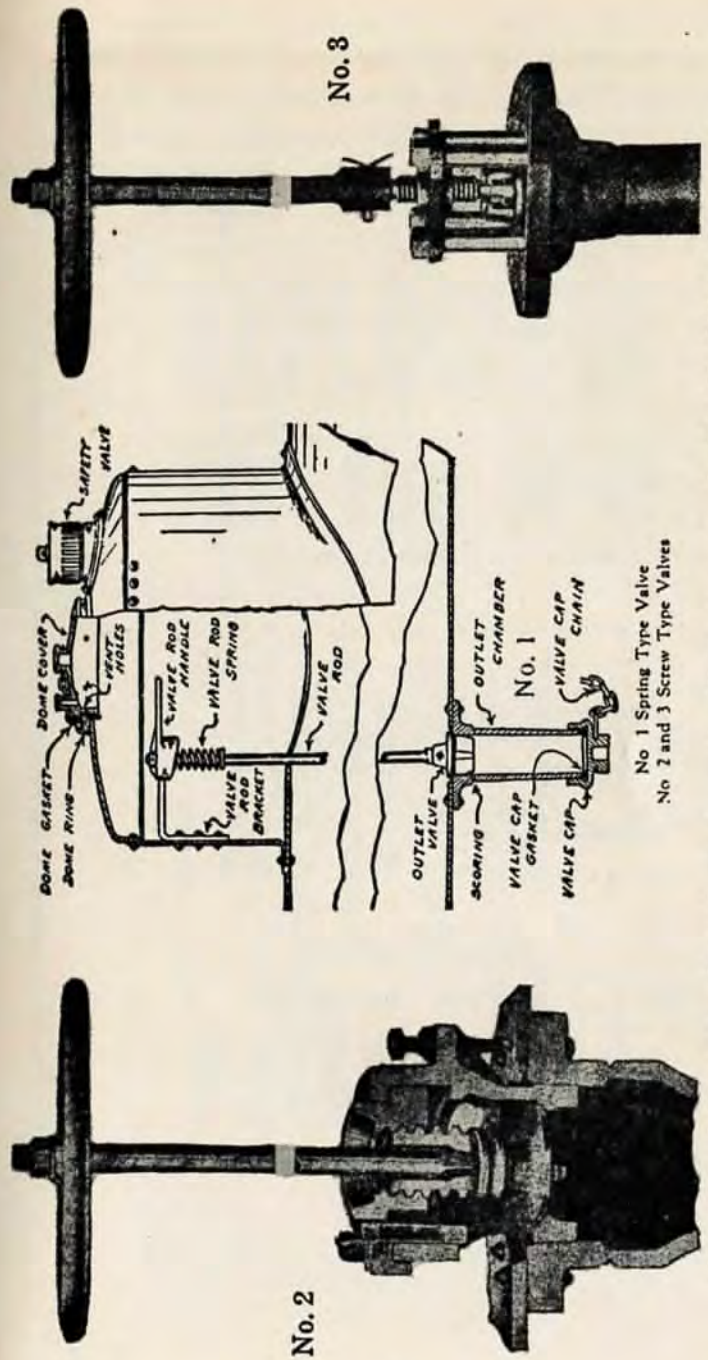


Fig. 1



Valve No. 1 (four out of 5 tank cars have it) still continues to take its toll of life and property.

Fig. 2

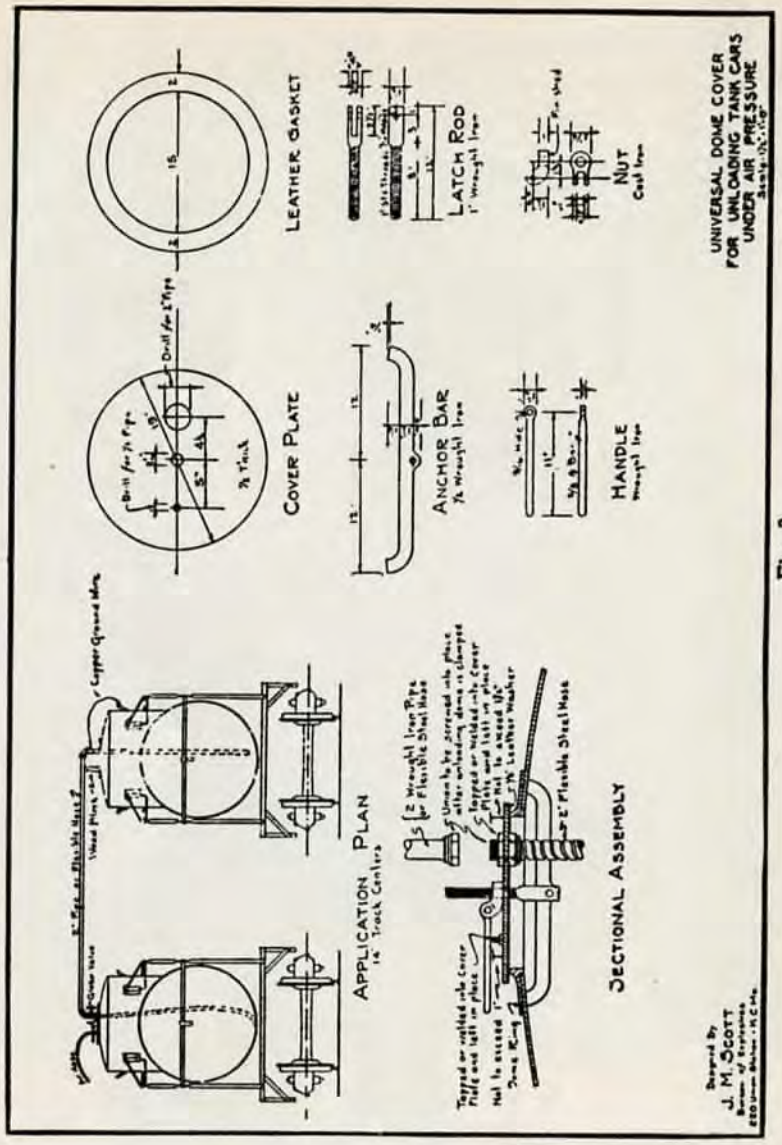


Fig. 3

The following placards serve to indicate the nature of the contents of cars and some of the precautions to be taken in the handling of the cars to which they are attached:

14 inches

11 inches

_____ R _____ COMPANY

EXPLOSIVES

(TO BE PRINTED IN RED)

HANDLE CAREFULLY

KEEP FIRE AWAY

(TO BE PRINTED IN RED)

_____ STATION _____ 19

CONDENSED RULES FOR HANDLING THIS CAR

1. In switching this car in yards or on sidings have a non-placarded car between this car and engine.
2. This car must not be cut off while in motion.
3. Avoid all shocks to this car. Other cars must not be allowed to strike this car. Couple carefully.
4. When the explosives are unloaded this placard must be removed from car.

EXPLOSIVES PLACARD
(Reduced Size)

14¼ Inches

10 Inches

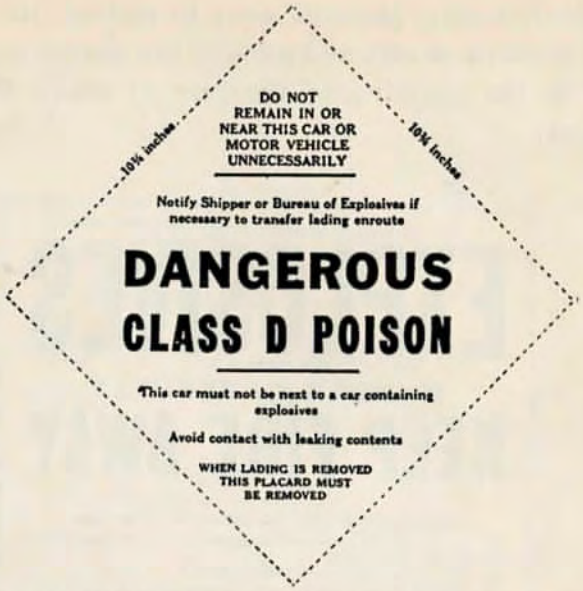
CAUTION

This Car Contains

POISON GAS

Beware of Fumes from Leaking Packages.

POISON GAS PLACARD
(Reduced size)



DANGEROUS PLACARD FOR CLASS D POISONS
(Reduced size)