SCENARIO #12

FIRE INVOLVING STATIONARY TANK

FIGURE 8-41

A carelessly discarded cigarette by a passing motorist has started a grass fire in the rear of Noll Manufacturing. The fire has spread along the highway and is now spreading to and under a 1,000 gallon ASME stationary aboveground storage tank. The propane tank is 25 feet away from the wall of the high school gymnasium. An adjacent 1,000 gallon storage tank is next to the burning tank but is not involved. A church, grocery store, and gasoline station are across the street. The fire has been burning for some time and several spectators are present. Shortly after the arrival of emergency responders, the pressure relief valve operates and ignites. The spectators inform the responders that the grass fire has been burning for about 25 minutes but only in the last few minutes has it reached the propane storage tank. There is discoloration on the burning tank and some of the paint is beginning to blister. There is no discoloration or blistering on the adjacent tank.

SUMMARY OF CONSTRUCTION FEATURES

ASME stationary tanks can be found at homes and at commercial, industrial, and agricultural facilities. Stationary tanks can also be found at service stations for refilling recreational and motor fuel tanks. Stationary tanks are normally filled from a bobtail truck.

Most stationary tanks are built by welding two heads to a barrel. Their capacities typically range from 250 to 2,000 gallons, with most domestic tanks being less than 1,000 gallons. ASME stationary tanks are designed for different working pressures depending on their intended service. The normal working pressure for stationary

propane service is 250 psig. Fittings for valves less than 2,000 gallons capacity are normally threaded. Threaded appurtenances are commonly 1-1/4 inch male NPT or 2-1/2 inch female NPT for multiple valves with some special flanges for liquid level gauges. Openings are normally located on top of the tank.

The nature of pressure vessels and containment systems makes them vulnerable to external heating.

- A propane tank contains liquid and vapor. Any external fire creating direct flame impingement in the vapor space will heat the tanks shell. The fire will heat the tank shell in the vapor space more rapidly than in the area in contact with liquid.
- In most cases the tank's pressure relief valve (PRV) will function early in the fire. As the PRV functions gas escapes, lowering the liquid level inside the tank, even further, thus exposing a larger surface area of the tank in the vapor space.
- Firefighters should be aware that a functioning pressure relief valve on a burning propane tank is not a reliable indication that the tank is safe to approach or a reliable indicator of when or if a tank may fail. Likewise, containers may fail even if the pressure relief valve is not operating.
- Rapid application of cooling water on the outside of the tank above the liquid level can reduce the likelihood of container failure by lowering the external temperature of the shell of the exposed tank.
- Cooling water applied to the tank will not necessarily lower the temperature of the liquid inside the container. Basically, the liquid acts as a heat sink and protects itself. This is why failure of the tank in the liquid space is non-existent.
- Any decision to approach a propane tank showing direct flame impingement on its vapor space must be made on a case-by-case basis after evaluating the hazards and risks. How long fire has been impinging on the tank is a key risk factor.

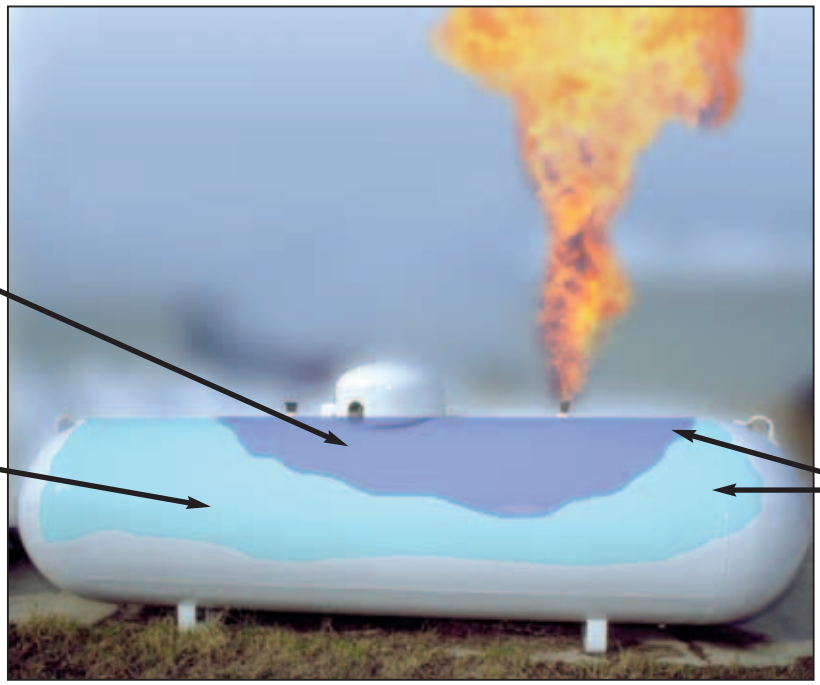

FIGURE 8-42

- Bulk storage tanks can fail within 20 to 30 minutes of direct flame impingement if containers are not adequately cooled.

INCIDENT ACTION PLAN

TACTICAL OBJECTIVES

The primary objective is to cool the total surface area on the outside of both stationary tank shells and at the point of flame impingement so that the internal tank pressure of the burning tank drops to the point where the pressure relief valve closes and the tank valve can be manually closed.

Secondary objectives are to protect exposures, extinguish any ground or structural fires, and check for extension of the fire into the school gymnasium.

METHODS FOR CONTROL IN THE EVENT OF FIRE

1 This 1,000 gallon propane tank requires a minimum continuous flow of 100 gpm on the entire tank surface to adequately cool the tank shell. This can be provided through a 1-1/2 or 1-3/4 inch attack line flowing 100 gpm or higher for each tank. Two handlines are recommended to attack and extinguish the fire. The first line should be placed in service as soon as possible and be played evenly on the burning tank shell to keep it cool while the second line is being deployed. The third line should be placed on the adjacent tank. A fourth line is recommended to protect the attack crews and protect exposures.

2 Crews should continue cooling the tank shell until the pressure relief valve closes and the tank shell does not produce steam. Once the pressure relief valve has closed and the tank shell is cooled both attack teams should simultaneously advance toward the burning tank from the side of the tank, under the protection of fog patterns. Nozzle patterns should be adjusted so that they overlap and provide the broadest possible protection as crews advance to close the tanks valve under the dome cover.

3. Cooling water must be applied at the point of flame impingement and on the entire upper half of the tank shell.

   (a) Maintain a wetted surface on the entire upper section of the tank shell.

   (b) Remember to cool both sides of the container.

   (c) Continue to cool the tank until well after the fire has been extinguished. The initial application of water to the super heated steel will generate steam. When steam no longer appears it is an indication the situation is coming under control. The metal surface should be cool enough to touch.

Additional factors to consider for this operation include:

- If a fixed mounted master stream such as a deck gun on a pumper can be placed in service immediately, it should directed onto the burning tank until handlines are deployed.
- It is important that nozzles on handlines match so that there is a constant flow and nozzle patterns are compatible. If variable gallonage nozzles are being used and are being supplied from two different pumpers, the driver/operators must ensure that they are maintaining a coordinated fire flow.

- The back-up handline should be supplied from a water supply which is independent of the primary attack line in case the primary handline loses its water supply.
- In rural water supply operations, it is important that pumpers be adequately supplied so that water supplies are not expended once the initial attack begins. Water supplies obtained from portable drafting basins and shuttle tankers must be able to meet the required fire flows.
- Heavier hose streams and fire flows may be required if the fire has communicated to the structure, e.g., in this scenario, the school is a primary exposure.
- The area around the tank and inside the adjacent structure should be monitored for flammable gas using a combustible gas indicator (CGI.)

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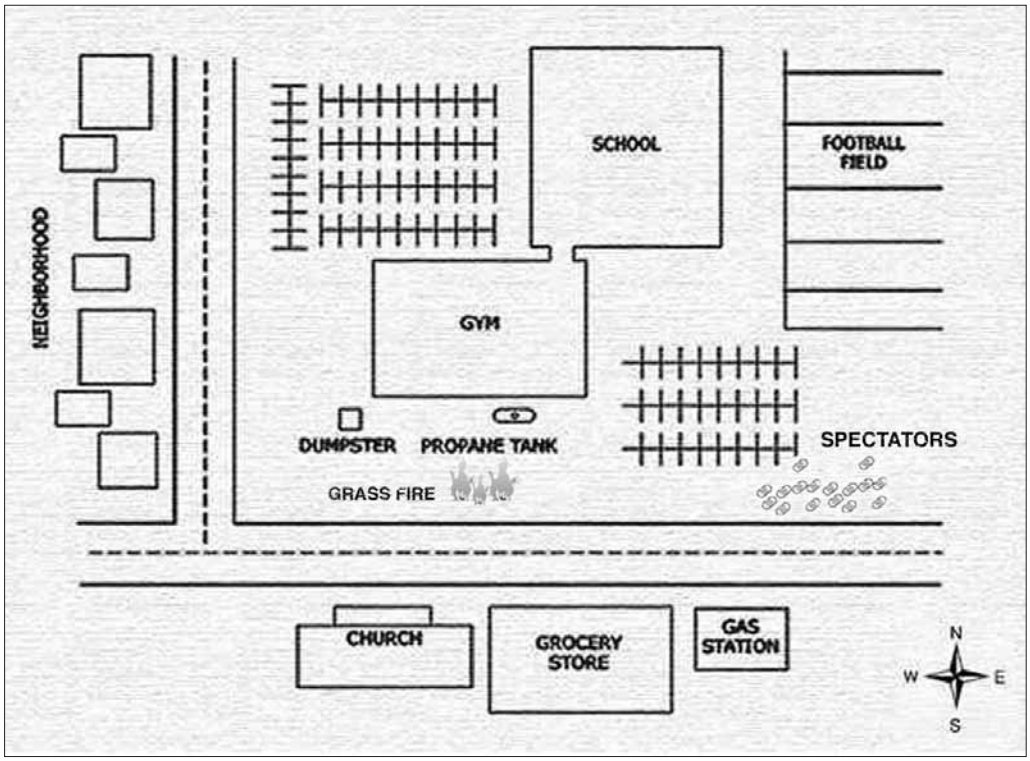

FIGURE 8-43