



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

H-0588A

Date: November 1, 1996

In reply refer to: H-96-37 through -39

Mr. Daniel N. Myers
Executive Vice President
National Propane Gas Association
1600 Eisenhower Avenue
Suite 100
Lisle, Illinois 60532

About 10:10 a.m. on August 16, 1995, propane, a liquefied flammable gas, sprayed from the unloading system on the back of an AmeriGas Propane, L.P., (AmeriGas) cargo tank truck as the driver was preparing to transfer propane from the truck to fill a fuel tank for an irrigation pump on a farm in Fremont County, Idaho. The driver had turned on the truck's cargo transfer pump and had pressurized the unloading system with liquid propane before unreeling the cargo transfer hose. Then, while the driver was unreeling the hose, propane sprayed from an area where the liquid propane supply lines from the tank attach to the hose reel. Unable to reach a shut-off valve or an engine-kill switch on the back of the truck near the spraying propane, the driver ran to the cab of the truck and attempted to shut off the truck engine, which powered the cargo transfer pump. His attempt was unsuccessful, and the propane ignited.

The driver was knocked down by the explosion and was burned on his head, face, arms, and chest. After the explosion, the driver ran and jumped into a nearby river. He also broke his ankle during his escape from the fire.

The emergency responders could not shut off the flow of propane; therefore, they allowed the 2,000 gallons of propane in the cargo tank and an unknown quantity of propane in the fuel tank for the irrigation pump to burn until depleted, about 19 hours. Property damage was limited to the truck and its cargo tank, the irrigation pump and its fuel tank, and a small motorcycle parked nearby.

After the accident, National Transportation Safety Board investigators examined the liquid unloading system to determine the exact location and cause of the leakage. They found no defects in the steel piping that supplied liquid propane to the hose reel but identified three other potential sources of leakage where the leak was observed: an in-line pressure relief valve, a flex connector, and a swivel joint for the hose reel.

These three components were examined and, if possible, tested. The pressure relief valve opened at less than the design pressure: this is consistent with the effect of heating an internal

6735

valve spring during a fire. A disk that functions as a seal in the valve showed some heat damage but was still functional. The flex connector, adjacent to the hose reel, was pressure tested and did not leak. The swivel joint had a synthetic rubber packing ring, which was designed to seal propane within the joint when rotated. The swivel joint had leaked propane in March 1995; therefore, the packing and bearings had been replaced. The cause of the March 1995 failure had not been determined by AmeriGas. After the August 16, 1995, accident, the bearings were found to have soot and discoloration, indicating they had been exposed to the fire, but they were still functional. The packing ring could not be examined because it had been consumed by the fire, leaving only a black residue. The Safety Board concludes that the propane leak was the result of the failure of the swivel joint packing in the cargo transfer hose reel.

AmeriGas uses the *National Propane Gas Association [NPGA] Training Guidebook Series*.¹ The second guidebook in this series instructs drivers to attach a cargo transfer hose to a customer's tank before pressurizing the unloading system by opening the cargo tank internal valve and all in-line valves.² However, the AmeriGas district manager and the regional safety director were not familiar with these NPGA-recommended procedures. When asked after the accident whether the driver should open the valves on the cargo tank and pressurize the unloading system before or after attaching the hose to the customer's tank, the AmeriGas district manager stated that opening the valves before attaching the hose was a more efficient unloading procedure. The driver stated that he had been trained by the previous driver to open all valves on the cargo tank before taking the hose to the customer's tank. The AmeriGas service maintenance man said that he trained the driver to attach the cargo transfer hose to the customer's tank before opening the valves on the cargo tank. The driver stated that he had seen the service maintenance man connect the hose before opening the valves on the cargo tank and considered both methods acceptable. The company's file on the driver indicates that he had received the NPGA guidebook *LP - Gas Transportation and Delivery*, but had not taken an available test for the series.

The Safety Board concludes that the driver was unable to stop the flow of propane because AmeriGas had failed to ensure that the driver followed the industry-recommended guideline to connect the cargo transfer hose to the customer's tank before pressurizing the truck's cargo transfer system. Had the driver attached the hose to the customer's tank before pressurizing the cargo transfer system, he would have been near operating controls for the cargo transfer pump and the shutoff valve for liquid transfer lines when the leak occurred and would have been able to quickly stop the leak before the propane ignited. Therefore, the Safety Board urges the NPGA to notify its members of the circumstances of this accident, emphasizing the importance of having drivers attach a cargo transfer hose to a customer's tank before pressurizing the cargo transfer system.

¹ *National Propane Gas Association Training Guidebook Series*, National Propane Gas Association, Lisle, Illinois, 1979 and 1984. (Five guidebooks are in the series.)

² *LP-Gas Transportation and Delivery*, Chapter 14, "Filling Tanks and Cylinders from a Bulk Truck."

Safety Board investigators reviewed the NPGA's *Certified Employee Training Program*,³ which replaced the NPGA guidebook series. The current training procedures instruct the driver to attach the hose to the customer's tank before turning on the pump and pressurizing the cargo transfer system.⁴ However, the instructor's manual and test answer sheet for this procedure state that the operator must first attach the cargo transfer hose and then fill the tank. They do not review the need to connect the cargo transfer hose to the customer's tank before pressurizing the cargo transfer system. Therefore, the Safety Board urges the NPGA to modify its certified employee training program instructor's manual and test answer sheet to reinforce the need to connect the cargo transfer hose to the customer's tank before pressurizing the cargo transfer system.

The NPGA has also issued several safety guidelines concerning the safe unloading of propane from cargo tanks. NPGA guideline #158-93, *Connecting and Disconnecting Delivery Hose Equipped with a Filler Hose Adapter* provides step-by-step procedures for connecting a hose to a customer's tank before pressurizing the cargo transfer system. These procedures conform with those found in the NPGA training manuals. However, NPGA guideline #158-93 focuses specifically on attaching hoses with a filler hose adapter to tanks and not on general procedures for attaching hoses to a customer's tanks. NPGA guideline #111-89, *Safety Considerations in Bobtail Deliveries*, provides general procedures for attaching to a customer's tank, but it does not provide clear procedures for drivers to follow when connecting cargo tanks to begin cargo transfer. The Safety Board urges the NPGA to amend NPGA guideline #111-89 to conform with the step-by-step procedures for connecting a hose to a customer's tank before pressurizing the cargo transfer system that are found in NPGA guideline #158-93 and NPGA training manuals.

Therefore, as a result of this accident investigation, the National Transportation Safety Board recommends that the National Propane Gas Association:

Notify its members about the circumstances of the accident in Fremont County, Idaho, on August 16, 1995, emphasizing the need for drivers to attach a cargo transfer hose to a customer tank before pressurizing the truck's cargo transfer system. (H-96-37)

Modify its *Certified Employee Training Program* instructor's manual and test answer sheet to reinforce the need to connect the cargo transfer hose to the customer's tank before pressurizing the cargo transfer system. (H-96-38)

Amend National Propane Gas Association (NPGA) guideline #111-89, *Safety Considerations in Bobtail Deliveries* to conform with the step-by-step procedures for connecting a hose to a customer's tank before pressurizing the cargo transfer

³ *Certified Employee Training Program*, National Propane Gas Association, Lisle, Illinois, 1996.

⁴ Section 2 2, "Filling Propane Storage Containers," part (5)(c)

system that are found in NPGA guideline #158-93, *Connecting and Disconnecting Delivery Hose Equipped with a Filler Hose Adapter*, and NPGA training manuals. (H-96-39)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations H-96-37 through -39 in your reply. If you need additional information, you may call (202) 314-6460.

Also, the Safety Board issued Safety Recommendation H-96-36 to Amerigas Propane, L.P.

Chairman Hall, Vice Chairman Francis, and Members Hammerschmidt, Goglia, and Black concurred in these recommendations.

By: Jim Hall


Chairman