

Log R-465

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: March 15, 1984

Forwarded to:

Honorable John H. Riley
Administrator
Federal Railroad Administration
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-84-15

At 4 a.m., c.d.t., on July 30, 1983, vinyl chloride under pressure escaped from a newly loaded but not yet secured railroad tank car at the loading facility within Formosa Plastic Corporation's (Formosa) plant at Baton Rouge, Louisiana. The tank car was a U.S. Department of Transportation (DOT) Specification 105 A 300 W tank car, UTLX 96402, built by the Union Tank Car (UTC) company. Soon thereafter, the released vinyl chloride was ignited and formed a large billowing fire. An adjacent tank car containing vinyl chloride became directly involved in the fire. Tank car UTLX 96402 lost its contents through its loading piping at the top of the tank and was destroyed by fire fueled by the pool of the escaping vinyl chloride which formed beneath it; the torch-like fire that emanated from the tank car UTLX 96402 impinged upon the adjacent tank car causing its shell to thin, bulge, and rupture nonviolently. As a result of this accident, two persons were injured and the safety of the adjacent community was endangered. Had the second tank car ruptured violently, a potential for catastrophic losses existed because of the threat posed to the vinyl chloride manufacturing plant, vinyl chloride storage spheres, chlorine storage tanks, numerous tank cars, and other plant facilities. 1/

The Safety Board determined that tank car UTLX 96402 had been loaded with vinyl chloride about midnight on July 29, 1983, that the plant loading valve at the loading platform had been closed, and that the vapor return valve on the tank car had been closed; however, the tank car was not ready for transportation because the two liquid valves on the tank car had not been closed and the hoses connected to the liquid and vapor return piping had not been disconnected. For a yet undetermined reason, the coupler on one of the liquid hoses separated from its connection to the tank liquid piping. Vinyl chloride began flowing out of the tank at 120 psi through the open piping and, because the two hoses were connected at the manifold chamber on the loading platform, through the disconnected end of the liquid hose.

An inspection of the tank car liquid lines by Federal Railroad Administration (FRA) inspectors and Formosa personnel during investigation determined that the seats of the two excess flow valves which were located below the liquid valves in the liquid piping

1/ A full report of the investigation of this accident will be issued later.

within the tank were not screwed into their threaded housings within the excess flow valve body; consequently, the excess flow valves were unable to operate to shut off the sudden outward flow of liquid from the tank car. Federal regulation requires that the internal liquid piping of a car used to transport specific hazardous materials be equipped with an excess flow valve located just below each external liquid valve. The excess flow valve is a safety device designed to shut off the sudden outward flow of liquid in the event the external liquid valve is damaged or knocked off the piping during transportation. Depending upon the design of the external piping, a tank car may require two to five excess flow valves to be installed.

After the accident the UTC selected for inspection at its Kansas facility three tank cars (UTLX 96254, UTLX 96397, and UTLX 96409) which were similar to and manufactured about the same date as the one involved in the July 1983 accident. The UTC reported that all excess flow valve seats in these cars were found to be positioned properly. ^{2/} Also after the accident, Formosa began inspecting all empty incoming tank cars received that had been purged of hazardous materials to determine if the excess flow valve seats were properly positioned. These initial inspections found 12 of 18 UTC tank cars with one or more improperly positioned excess flow valve seats, including tank car UTLX 96254 which had been inspected and approved for service by the UTC just before Formosa's inspection.

Five similar UTLX cars used by Formosa were inspected jointly by Formosa and FRA inspectors: on November 4, 1983, a tank car at Ville Platte, Louisiana, contained two improperly positioned excess flow valve seats; three out of four tank cars inspected on January 11 and 12, 1984, at Eldorado, Kansas, contained a total of nine improperly positioned excess flow valve seats. Through February 1984, 23 of the 38 tank cars inspected either by Formosa or jointly by Formosa and FRA inspectors have been found with one or more improperly positioned excess flow valve seats.

Because of the foregoing findings, a review of the damage to tank cars in a number of other accidents was performed to determine whether improperly positioned excess flow valves may have been a factor in the loss of hazardous materials. It was determined that in several accidents at least one tank car liquid valve had been damaged and that the ensuing loss of material from that tank car might have been due to an improperly functioning excess flow valve; however, documentation was not sufficient to determine whether an improperly positioned excess flow valve seat was involved in any case.

On March 1 and 7, 1984, the Safety Board received notification of accidents in which the excess flow valves apparently failed to shut off the outward flow of product. One accident involved the release of vinyl chloride while a tank car was being unloaded, and the other involved the release of chlorine when the liquid valve was damaged as a result of a collision. Both tank cars will be inspected after the products are removed and the tanks are purged of hazardous materials.

Formosa and UTC are continuing their inspections of tank cars to determine the extent and cause of the improperly positioned excess flow valve seats in tank cars used by Formosa. However, the Safety Board concludes that the problem of improperly positioned excess flow valve seats also may be a general problem affecting the safety of many other tank cars. The problem may be a result of either design, manufacturing, installation, maintenance, or operation. All improperly positioned excess flow valve seats found during

^{2/} As used herein, the term "positioned properly" means that the threaded excess flow valve seat was screwed fully into the threaded housing of the excess flow valve body.

the inspections conducted thus far were produced by the Midland Manufacturing Corporation (Midland) and based on information provided by tank car companies, about 95 percent of all excess flow valves they have installed in tank cars were produced by Midland. At the time these excess flow valves were installed on these cars, Midland had not issued any specific instructions for the installation, maintenance, or operation of its excess flow valves.

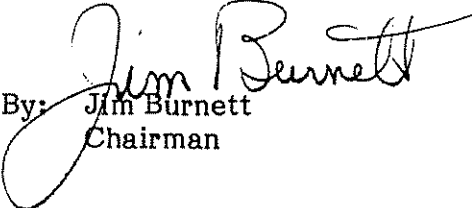
Data sufficient to determine the number of tank cars equipped with excess flow valves are not available. However, a major portion of the more than 50,000 DOT Specification 105, 112, and 114 tank cars are required to have excess flow valves. Based on the findings thus far, it is evident that this required safety device should not be relied upon to prevent the outward flow of highly volatile and toxic materials transported in these tank cars should an external valve be damaged.

The Safety Board is concerned that improperly positioned excess flow valve seats could allow minor railroad accidents to escalate into major threats to public safety. Moreover, the Safety Board is aware that it is common practice for many shippers and receivers to rely upon the proper functioning of excess flow valves to protect against the inadvertent outward flow of hazardous materials from tank cars during loading and unloading operations. Also, these valves have been relied upon to stop the flow of hazardous materials from tank cars when replacing and/or repairing liquid valves and when replacing gaskets.

Therefore, the National Transportation Safety Board recommends that the Federal Railroad Administration:

Immediately initiate inspections of tank cars equipped with excess flow valves to determine the extent to which these tank cars may have improperly positioned excess flow valve seats, determine the cause of deficient conditions found, and require correction of deficiencies before inspected tank cars are returned to service. (Class I, Urgent Action)
(R-84-15)

BURNETT, Chairman, GOLDMAN, Vice Chairman, and BURSLEY, ENGEN, and GROSE, Members, concurred in this recommendation.

By: 
Jim Burnett
Chairman