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**NATIONAL TRANSPORTATION SAFETY BOARD**  
**WASHINGTON, D.C.**

ISSUED: March 9, 1978

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Forwarded to:

Baron H. Whitaker  
President  
Underwriters Laboratories, Inc.  
207 E. Ohio Street  
Chicago, Illinois 60611

**SAFETY RECOMMENDATION(S)**

I-78-6 and 7

The National Transportation Safety Board conducted a special investigation into selected safeguards against bulk gasoline delivery risks at automotive service stations. This investigation was based on a critical review of a fire and explosion near Gadsden, Alabama, on August 31, 1976, which killed 3 firefighters and injured 28 persons. The Safety Board's findings are reported in its Special Investigation Report, "An Overview of a Bulk Gasoline Delivery Fire and Explosion."

The investigation disclosed that misuse and unsafe modification of Underwriters Laboratories, Inc., (UL) listed equipment can increase accident risks and that the performance of certain UL-listed tanks in fires might be improved.

The Underwriters Laboratories, Inc. acknowledges that many products investigated may cease to meet its standards because of misuse, failure to follow instructions, failure to inspect and maintain the product, or other factors after manufacture which affect the safety of the product. The incident at Gadsden illustrates the safety consequences of such changes. A gasoline transfer pump driven by a UL-listed electric motor was modified in a manner that did not meet the UL standards. This equipment provided an ignition source for the spilled gasoline involved in the accident. The Board could not determine when or why the first misuse or modification occurred. At the time of the accident, the equipment still carried the UL "listing mark" identifying it as a UL-listed product produced under UL's followup service. However, when the equipment was misused and modified, the impression that the equipment was safe, normally

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conveyed by the UL-listed mark, became invalid. No methods for controlling such changes are currently prescribed by UL. Other codes are relied on to control such changes, using principally installation and equipment safety standards. In view of the consequences of misuse and modification, reexamination of ways to warn users should be undertaken, especially in connection with hazardous materials transportation.

The performance of the UL-listed tank in the Gadsden accident raises other concerns. This tank also bore the UL-listing mark. UL "Standard for Safety No. 142" prescribes requirements covering horizontal tanks intended for the aboveground storage of flammable liquids at atmospheric pressures. They are intended for stationary installation in accordance with the National Fire Protection Association's Code No. 30 regarding flammable and combustible liquids. The NFPA code requires that such tanks be "properly" installed and equipped. "Properly" is judged by the standards in the NFPA codes. Thus, if the NFPA code provisions are relaxed or otherwise waived locally, the impression that the equipment is safe, normally conveyed by the UL-listing program, becomes invalid.

In addition, the behavior of the UL-listed tank in the Gadsden accident raises other concerns because it ruptured violently in the fire. The known mechanisms for violent ruptures of tanks are understood and can be successfully countered by various technical means. For example, materials of construction can be changed. While the steel storage tank ruptured violently, the aluminum cargo tank on the tank vehicle did not project fragments as it breached. The comparative performance of the two tanks suggests that the UL "Standard for Safety No. 142" could be improved to provide safeguards against such violent ruptures. This accident also indicates that pressure-relief devices cannot be relied on to protect tanks against violent ruptures. Other methods for providing protection should be explored so tanks are protected against explosions even when improperly installed.

Based upon its special investigation and findings, the National Transportation Safety Board recommends that the Underwriters Laboratories, Inc.:

Determine and adopt alternative ways to reduce the likelihood of misuse and unsafe modification of listed industrial products after their manufacture, with special emphasis on products that might be used in the transportation, storage, or transfer of bulk hazardous materials. (Class II, Priority Action) (I-78-6)

Review and amend UL "Standard for Safety No. 142" for above-ground storage tanks for Class I liquids to protect against violent ruptures and explosions in fires involving such tanks. (Class II, Priority Action) (I-78-7)

BAILEY, Acting Chairman, McADAMS, HOGUE, and KING, Members, concurred in the above recommendations.

A handwritten signature in cursive script that reads "Kay Bailey". The signature is written in black ink and is positioned to the right of the typed name.

By: Kay Bailey  
Acting Chairman