



# National Transportation Safety Board

Washington, D. C. 20594

## Safety Recommendation

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**Date:** October 28, 1992

**In Reply Refer To:** I-92-3

Mr. Thomas L. Gossage  
Chief Executive Officer  
Hercules Incorporated  
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About 9:10 a.m. on December 11, 1990, a tractor-semitrailer in the southbound lanes of I-75 near Calhoun, Tennessee, struck the rear of another tractor-semitrailer that had slowed because of fog. The uninjured truckdrivers exited their vehicles and attempted to check for damage. After the initial collision, an automobile struck the rear of the second truck and was in turn struck in the rear by another tractor-semitrailer. Fire ensued and consumed two trucks and the automobile. Meanwhile, in the northbound lanes of I-75, an automobile struck the rear of another automobile that had slowed because of fog. Then, a pickup truck and two other automobiles became involved in the chain-reaction rear end collision. No fatalities, injuries, or fires occurred. Subsequently, 99 vehicles in the northbound and southbound lanes were involved in multiple-vehicle chain-reaction collisions that killed 12 people and injured 42 others.<sup>1</sup>

Three tractor-semitrailers transporting hazardous materials were in collisions: two in the northbound lanes and one in the southbound lanes.

The northbound semitrailers were cargo tanks, one of which held about 10,000 gallons of liquefied propane (flammable gas) and the other about 6,000 gallons of liquefied nitrogen (nonflammable gas). Neither tank was breached; the nitrogen vented through tank safety valves, as designed, to relieve pressure.

The southbound semitrailer carried 10 portable tanks. Each held about 400 gallons of dicumyl peroxide and weighed about 4,300 pounds filled. Transported in a granular, crystalline form, dicumyl peroxide is heated, until it liquefies at 100 °F, to fill and to empty the tanks. Above 240 °F, an extremely rapid, self-accelerating

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<sup>1</sup>For more detailed information, read Highway Accident Report--*Multiple-Vehicle Collisions and Fire during Limited Visibility (Fog) on Interstate 75 near Calhoun, Tennessee, on December 11, 1990* (NTSB/HAR-92/02).

decomposition occurs that results in release of heat. When this chemical reaction takes place, dicumyl peroxide changes from liquid to gaseous state, resulting very quickly in a large increase in pressure in an enclosed space, such as a tank. Flammable gases, including methane and ethane, are released during this reaction and, together with other products of decomposition, may cause eye, skin, and respiratory irritation. Water, dry chemicals, or carbon dioxide are recommended for extinguishing a dicumyl peroxide fire.

Designed and constructed to U.S. Department of Transportation (DOT) specification 57, each stainless steel portable tank carried up to 460 gallons and weighed about 750 pounds empty. To lift and move the tanks, stainless steel fork lift channels had been welded to each tank bottom; they also supported the tank. A 3 1/4-inch diameter plastic closure that provided double the pressure-relief venting capacity required by regulation was installed in the steel lid of each tank. The plastic closures acted as fusible pressure-relief devices and were designed to function between 260 and 290 °F.<sup>2</sup> Each 22 1/2-inch diameter steel lid was designed to pop off at 15 to 20 psi as an additional pressure-relief system to prevent rupture of the tank.

Postaccident examination of the tractor-semitrailer involved in the first southbound collision and subsequent fire revealed that 3 of its 10 portable dicumyl peroxide tanks were punctured. The similarities between the soot patterns on the tank walls at the punctures and the soot patterns on the outside walls of the tank indicated that the punctures occurred during the accident sequence before the fire. In addition, the size and shape of the punctures in the tank walls corresponded to the size and shape of the steel fork lift channels, indicating that the punctures were caused by the fork lift channels attached to other tanks. Therefore, the Safety Board concludes that the punctures on the three DOT specification 57 portable tanks transporting dicumyl peroxide were caused by the fork lift channels attached to other tanks.

The accident near Calhoun demonstrates that the potential for punctures from appurtenances extends to all types of hazardous material containers. Therefore, the National Transportation Safety Board believes that Hercules, Incorporated, should modify the design of the fork lift truck channels on its tanks to minimize the risk of puncturing other tanks.

Therefore, the National Transportation Safety Board recommends that Hercules, Incorporated:

Modify the design of the fork lift truck channels on U.S. Department of Transportation specification 57 portable tanks to minimize the risk of puncturing other portable tanks during an accident situation. (Class II, Priority Action) (I-92-3)

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<sup>2</sup>Title 49 Code of Federal Regulations 173.154(a)(3) requires fusible pressure-relief devices installed in DOT 57 portable tanks that transport dicumyl peroxide to function between 158 and 194 °F.

Also, the Safety Board issued Safety Recommendations H-92-86 to the U.S. Department of Transportation; H-92-87 and -88 to the Federal Highway Administration; H-92-89 and -90 to the National Highway Traffic Safety Administration; I-92-1 and -2 to the Research and Special Programs Administration; H-92-91 to the Tennessee Department of Transportation; H-92-92 to the Tennessee Highway Patrol; H-92-93 through -95 to the American Association of Motor Vehicle Administrators; I-92-4 to the Charleston Volunteer Fire Department; H-92-96 to the American Automobile Association; and H-92-97 to the American Driver and Traffic Safety Education Association.

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 recommendation in this letter. Please refer to Safety Recommendation I-92-3 in your reply.

VOGT, Chairman, COUGHLIN, Vice Chairman, and LAUBER, HART, and HAMMERSCHMIDT, Members, concurred in this recommendation.



By: Carl W. Vogt  
Chairman