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National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: October 28, 1992

In Reply Refer To: H-92-91

Honorable Jimmy M. Evans
Commissioner
Tennessee Department of Transportation
700 James K. Polk State Office building
505 Deaderick Street
Nashville, Tennessee 37243-0333

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.¹

By 1979, the Tennessee Department of Transportation (TDOT) had identified the I-75 fog-prone area near Calhoun and by early 1980, had implemented the countermeasures recommended by a Tennessee diagnostic study team. Those countermeasures included improving edge and center line striping and installing retroreflective pavement markers. Although visibility was poor on I-75 during the 1990 accident, investigators found that no driver apparently left the road unintentionally.

The diagnostic study team also recommended increasing the number of fog warning signs and adding flashing beacons to existing warning signs. At the time of this accident, the warning signs and flashing beacons advised drivers that fog was present; however, some drivers stated that even so, they did not slow their vehicles

¹For 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).

before conditions worsened. Some drivers familiar with the highway doubted the credibility of the southbound fog warning sign because its beacons had been flashing for the previous 3 days during clear weather. Since the accident, the TDOT has installed LIGHTS ON IN FOG signs; nonetheless, this advisory is not likely to prevent speed variation because drivers may respond differently to the information. The LIGHTS ON IN FOG sign is an example of nonspecific behavioral guidance (preferred specific behavioral guidance, mentioned in numerous driver licensing manuals, would be USE LOW BEAM to improve sight distance). The National Transportation Safety Board concludes that the fog warning signs and flashing beacons were not sufficient to produce uniform driver behavior and were ineffective in part as warning devices in this accident because they did not consistently reflect actual conditions.

Respondents to the Safety Board questionnaire that was sent to drivers who were in the Calhoun accident often noted the discrepancy between activated fog warning beacons and the lack of fog that led many drivers to ignore the signs in the fog-prone area. Similar behavior has been reported in earlier studies of fog-prone areas² and construction zones³ and in the Safety Board special fog hearing.⁴ The Safety Board believes that the credibility of highway and weather condition warning and behavioral guidance signs is essential to reducing speed variation. Therefore, these signs should be activated only during limited-visibility conditions and should be promptly deactivated when the message is no longer appropriate. During limited-visibility conditions, when strict traffic control is effected through changeable message signs, one noncomplying driver can cause variations in speed that severely disrupt traffic flow and lead to collisions. Therefore, drivers need to be informed about the importance of obeying these signs, and compliance should be strictly enforced.

At the time of the accident, other fog countermeasures for I-75 near Calhoun included parking a Tennessee Highway Patrol (THP) car with emergency lights flashing ahead of the fog area to slow and redirect traffic onto alternate routes and closing the affected section of the highway. Although troopers detected fog in the area, they did not consider it hazardous; consequently, no THP countermeasures were initiated.

Since the accident, the THP has implemented a formal, written plan that is similar to previous practice. The plan includes parking a patrol car with emergency lights flashing in advance of the fog area to slow traffic. Although this countermeasure may temporarily slow traffic, it will neither provide drivers with specific behavioral guidance, such as SLOW TO AND MAINTAIN 25 MPH, nor ensure that drivers operate their vehicles at uniform reduced speeds through the affected area. Therefore, the Safety Board concludes that the new THP plan does not provide sufficiently specific behavioral guidance for motorists on uniform speed during

²Richard N. Schwab, "Minimizing the Hazard of Restricted Visibility in Fog," *Public Roads*, September 1972, p. 56.

³At the January 1991 Transportation Research Board Human Factors Workshop on Construction Zones, attendees agreed that inappropriate signing in construction zones has led to a national disregard of many highway signs. Motorists reported that they delay altering their speed or exercising caution until in sight of the hazard or construction ahead.

⁴Several speakers stated that after just one experience with an inappropriately messaged sign, a driver may need 20 or more subsequent exposures to a correctly messaged sign to again have confidence in its message.

limited visibility to be an effective countermeasure and to prevent multiple-vehicle collisions.

The new THP plan also includes highway closure and traffic detour, which require considerable time and resources for successful implementation. The THP had not closed I-75 near Calhoun for fog-related reasons in the 11 years preceding the accident; consequently, the effectiveness of this countermeasure could not be evaluated.

The Safety Board believes that the TDOT, in cooperation with the THP, should revise the plan of action and the surveillance and response plan. The plans should provide for the immediate detection of traffic flow disruption and fog, uniform driver response to reduce and maintain traffic speed in advance of and through the hazardous area, enforcement of countermeasures, and a public information and education program to ensure that motorists receive specific behavioral guidance for the fog-prone area. The strategic placement of traffic flow detectors that automatically activate traffic control devices would ensure prompt detection of hazardous conditions other than fog, such as an accident, and would alert drivers to make appropriate speed reductions in advance of and through the area.

Therefore, the National Transportation Safety Board recommends that the Tennessee Department of Transportation:

In cooperation with the Tennessee Highway Patrol, revise the 1992 Tennessee Department of Transportation and Tennessee Highway Patrol Plan of Action and the Surveillance and Response Plan. The plans should provide for the immediate detection of traffic flow disruption and fog, uniform driver response to reduce and maintain traffic speed in advance of and through the hazardous area, enforcement of countermeasures, and a public information and education program to ensure that motorists receive specific behavioral guidance for the fog-prone area. (Class II, Priority Action) (H-92-91)

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-92-92 to the Tennessee Highway Patrol; H-92-93 through -95 to the American Association of Motor Vehicle Administrators; I-92-3 to Hercules, Incorporated; 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 H-92-91 in your reply.

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



By: Carl W. Vogt
Chairman