

H-217A

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: May 5, 1980

Forwarded to:

Honorable Scott M. Matheson
Governor of Utah
Salt Lake City, Utah 84114

SAFETY RECOMMENDATION(S)

H-80-38 through -40

About 6:25 a.m. and before dawn on September 12, 1979, a 1976 Dodge van, occupied by 14 senior citizens, overtook and collided with a slow-moving farm vehicle (windrower 1/) near Delta, Utah. The right front corner of the van struck the left rear edge of the 15 1/2-foot-wide cutting attachment that was mounted to the front of the windrower. The van rolled onto its left wheels, traveled off the right side of the road, and struck a concrete bridge parapet that was located 4 1/2 feet beyond the edge of the pavement. Eight van occupants were killed and six van passengers were injured; the driver of the windrower was not injured. The windrower was being operated with two white head lamps on the front of the machine and one white work lamp on the rear. 2/

The exterior lighting and delineation system of the 1973 International Harvester windrower complied with the American Society of Agricultural Engineers (ASAE) guidelines 3/ applicable for 1973 year models and consisted of the following:

1. Two white head lamps were mounted at the same level, one on each side of the front of the cab, facing forward;
2. One multimode combination white work lamp/red tail lamp was mounted on the driver's left side at the rear of the engine compartment. A switch mounted on the rear of the lamp housing was designed for selection of either the white light for use as a work lamp or the red light for use as a tail lamp. The switch was not labeled;

1/ A windrower is a farm machine that cuts and stacks grain or hay into rows.

2/ For more detailed information read "Highway Accident Report--Van/Slow-Moving Farm Vehicle Collision, U.S. Route 6/50, near Delta, Utah, September 12, 1979" (NTSB-HAR-80-2).

3/ American Society of Agricultural Engineers, "Agriculture Engineer's Yearbook," ASAE Standard S279.5, 1973 Edition.

3. One triangular, reflectorized, slow-moving vehicle (SMV) emblem was mounted on the left rear of the engine compartment;
4. Two strips of 1-inch-high by 6-inch-wide red reflective tape were mounted on the rear, near the left and right ends of the cutting attachment;
5. There were two double-faced hazard warning lamps, designed to signal a flashing amber light both to the front and the rear. One lamp was mounted on the driver's side and at the rear of the engine compartment. This lamp projected beyond the left side of the engine compartment and was visible from the front and the rear. The other lamp was mounted to the right of the driver and inside the engine compartment so that it was only visible from the rear. International Harvester reported that this lamp was originally installed outside of the engine compartment.

The amber flashing lamps of the windrower were not operable when tested by the Utah Highway Patrol shortly after the accident, and the driver reported that they were not operable at the time of the accident. Investigation revealed that the flasher unit was corroded, that the right side light bulb filament was broken, and that the left lamp appeared to have a poor ground connection.

The Utah Traffic Code 4/ requires slow-moving vehicles to be equipped with a slow-moving vehicle emblem and requires that farm vehicles with an electric lighting system have the following lighting equipment when operating on the highway:

1. Two single-beam or multiple-beam head lamps;
2. Two red lamps visible from a distance of not less than 500 feet to the rear, or one red lamp visible from a distance of not less than 500 feet to the rear and two red reflectors visible from a distance of 100 to 600 feet to the rear when illuminated by the high beams from headlamps. . . .The red lamps or reflectors should be mounted to indicate the extreme left and right projections of the vehicle.

The Utah Traffic Code does not require flashing amber or flashing red signal lamps. The driver reported that he was not familiar with the laws regarding the type of lamps required for moving farm equipment on the highway in the dark and that he was not familiar with how to operate the multimode light control that would have allowed him to comply with the Utah law.

The Uniform Vehicle Code also has lighting requirements for farm vehicles. 5/ The following is a comparison of the three lighting and delineation system requirements applicable to the 1973 windrower:

4/ "Utah Traffic Code - Rules of the Road - 1978" compiled by the Department of Public Safety, State of Utah.

5/ "Uniform Vehicle Code," Chapter 12, Section 12.215-Lamps, reflectors, and emblems on farm tractors, farm equipment, and implements of husbandry.

	Two front headlamps	Rear red tail lamp(s)	Amber hazard warning flashers	SMV emblem	Red lamp/reflector designating vehicle extremities
Utah Traffic Code requirements	X	X		X	X
Uniform Vehicle Code requirements	X	X	X	X	
ASAE guidelines applicable	X	X	X	X	X

On September 17, 1979, the Utah Highway Patrol, the International Harvester Corporation, and the Safety Board conducted a series of moving and stationary tests to determine the relative visibility of the windrower under similar light conditions. The cutting attachment and lights from the windrower involved in the accident were attached to a similar machine, which was parked at the point of impact. A similar van with high beams on was used to approach the windrower, and Safety Board investigators evaluated four windrower lighting configurations. The Safety Board investigators were aware of the accident circumstances and test conditions.

Under each test condition, some feature of the windrower's lighting and delineation system was visible for more than 1,000 feet. Even with no windrower lamps illuminated, the slow-moving vehicle emblem was visible for more than 1,000 feet. However, when the windrower lamps were turned off, other features that would have served to more fully identify the windrower, such as the red reflectors, were not visible until the van was less than 200 feet from the windrower. During tests conducted with the windrower headlamps and some rear lamp illuminated, the features that served to more fully identify the windrower became visible at greater distances as the brightness of the rear lamps decreased from white to amber to red. For example, the left extension of the machine was visible at less than 300 feet with only the white light on; it was visible at 800 feet with the flashing amber and tail lamp on; and it was visible at 1,000 feet with only the red tail lamp on.

The slow-moving vehicle emblem was not visible at distances beyond 300 feet when any form of rear lighting was in use. The emblem seemed to have been positioned too close to the left amber and red lamps, and its reflected color was too similar to the color of the lights for it to be distinguishable at greater distances. The rear white work lamp "washed out" all other features of the windrower until the van was less than 300 feet from the windrower.

On the basis of these tests and other data, the Safety Board concluded that the van driver probably saw the rear white work light, but was at best making a marginal passing maneuver around the light until he knew more about its source. While the van driver could have made a more cautious approach, for example, by slowing or by insuring more than 2 1/2 feet of side clearance around the light, his actions were far more understandable than operating the windrower without an adequate rear lighting and delineation system.

There are about 160 fatal accidents per year involving farm equipment on the nation's highways, and about 55 of these accidents involve collisions with other motor vehicles. Even with this relatively low number of fatal accidents, the farm equipment industry has taken significant steps toward reducing these accidents. The slow-moving vehicle emblem and two-way flasher systems have been adopted to warn other drivers, and roll-protective equipment has been adopted to protect the farm equipment operator. However, more and relatively simple measures can be taken to increase further the potential for safe highway operation. As indicated by the visibility tests conducted for this accident, further attention should be given to the placement of the slow-moving vehicle emblem so that other lights on the farm equipment do not mask its message. Better reflector or lighting systems that are not masked or subdued by other lights need to be developed for delineating the equipment. The windrower driver's stated lack of knowledge about operating the multimode light indicates that perhaps these light switches either should be labeled so that their use can be understood by all potential operators, or recircuited or not used to avoid confusion.

Based on these findings, the Safety Board has asked the American Society of Agricultural Engineers to reevaluate its standards for farm vehicle rear lighting and delineation systems. Also, the Safety Board has asked the National Committee on Uniform Traffic Laws and Ordinances to amend the Uniform Vehicle Code to provide guidelines for insuring that lighting and delineation systems do not obscure each other and to require systems that will delineate the extreme projections of all overwidth equipment.

The Safety Board is also asking all of the States to adopt the amended Uniform Vehicle Code standards regarding the marking and lighting of farm vehicles (implements of husbandry). In 1970, only 12 States had laws that were in substantial agreement with the tail light and reflector requirements of the Uniform Vehicle Code, 6/ and that number remained constant through the 70's. Although Utah is one of those 12 States, the amended Uniform Vehicle Code should contain new provisions regarding the marking and lighting of farm vehicles. Without a uniform law, equipment manufacturers cannot provide equipment that will provide uniform advance warning of slow-moving vehicles.

There was no method to determine the level of enforcement currently applied to farm vehicles operating on Utah's highways. However, this case and an acknowledged widespread problem of lack of maintenance of lighting systems for these vehicles indicates that there is a need for some action to motivate owners and operators of farm vehicles to properly maintain safety systems and properly train operators in their use. The only agency with an opportunity to examine these vehicles on the highway is the State highway patrol. The Utah patrol, through its selective enforcement program, should insure proper emphasis is placed on enforcing Utah regulations concerning the safe operation of farm vehicles (implements of husbandry) on the highways.

The bridge struck by the van was constructed in 1946. Utah Department of Transportation accident records from 1974 to 1979 did not contain any reports of accidents involving vehicles striking this bridge parapet or railing or reports of accidents involving vehicles entering the canal under the bridge. The bridge rail system consisted of

6/ "Agricultural Tractor Safety on Public Roads and Farms," a report to the Congress from the Secretary of Transportation, January 1971; "Traffic Laws Commentary--Farm Vehicle Equipment," National Committee on Uniform Traffic Laws and Ordinances, October 1974.

44-inch-high by 6-foot-long concrete parapets at each end with a 40-foot metal panel-type railing between the parapets. The parapets were not protected by an approach guardrail or any similar device. The metal panel-type railing and unprotected parapets do not meet current American Association of State Highway and Transportation Officials (AASHTO) criteria as outlined in the 1977 AASHTO publication, "Guide for Selecting, Locating, and Designing Traffic Barriers."

The Safety Board concluded that even though there was no guardrail system to protect against impact with the bridge parapet, this van accident had the potential to be as severe even if a conventional guardrail system had been in place. However, an unprotected bridge parapet and outdated bridge railing can present a considerable hazard to errant vehicles. National fatal accident records indicate that about 5 percent of the fatal accidents involving fixed objects occurred at bridges, culverts, and ditches, and that bridges are 50 times more hazardous than other roadway sections in single-vehicle, run-off-the-road accidents. ^{7/} The Safety Board understands that the State of Utah is aware of the problem of outdated bridge crash protection at this location and throughout the State and has a Roadside Obstacle Elimination Program to improve such locations on a priority basis. However, there has been little emphasis on the implementation of this program. The Safety Board believes that the State of Utah should reactivate this program and update all substandard bridge rail systems with priorities based on accident history and future traffic needs. Since U.S. 6/50 is a primary highway in central Utah and there is rapid development in that area, future traffic needs may justify an early update of the bridge rail system at this and similar locations along U.S. 6/50.

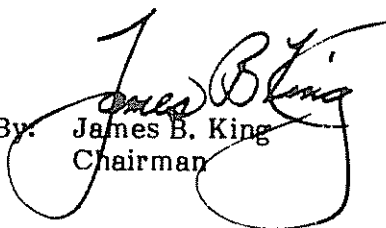
Therefore, the National Transportation Safety Board recommends that the State of Utah:

Adopt the amended Uniform Vehicle Code standards regarding the marking and lighting of farm vehicles (implements of husbandry). (Class III, Longer Term Action) (H-80-38)

Insure that its selective enforcement program places the proper emphasis on the enforcement of the Utah regulations concerning the safe operation of farm vehicles (implements of husbandry) on the highways. (Class II, Priority Action) (H-80-39)

Reactivate its Roadside Obstacle Elimination Program giving emphasis to updating unsafe bridge traffic barrier systems with priorities based on accident history and future traffic needs. (Class II, Priority Action) (H-80-40)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and BURSLEY, Members, concurred in these recommendations. GOLDMAN, Member, did not participate.

By: 
James B. King
Chairman

^{7/} "A Strategy for Selection of Bridges for Safety Improvement," Southwest Research Institute, presented at the 59th Transportation Research Board meeting, January 1980.

