NATIONAL TRANSPORTATION SAFETY BOARD
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(Information subject to editing)

Highway Special Investigation Report: Wrong-Way Driving
December 11, 2012

This is a synopsis from the National Transportation Safety Board's report and does not include the NTSB's rationale for the conclusions, probable cause, and safety recommendations. Safety Board staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing.

INTRODUCTION

This special investigation report looks at one of the most serious types of accidents that occur on our highways: collisions involving vehicles traveling the wrong way on high-speed divided highways. The goal of this investigative project is to identify relevant safety recommendations to prevent wrong-way collisions on such highways and access ramps. The investigations included in this report take a focused view of the driver and highway issues affecting wrong-way collisions.

The report is organized into four sections. Section 1, "Wrong-Way Collisions," defines the problem, examines the National Transportation Safety Board (NTSB) history with these types of collisions and generally surveys the data and research concerning wrong-way driving collisions. Section 2, "NTSB Investigations," summarizes nine NTSB wrong-way collision investigations. Section 3, "Characterization of Wrong-Way Driving," considers the components of wrong-way collisions and uses data, research, and NTSB investigative work to summarize these types of collisions. Section 4, "Countermeasures," provides recommendations to address wrong-way collisions. Those countermeasures are organized to address the following safety issues:

- Driver impairment, primarily from alcohol use, with consideration of older driver issues and possible drug involvement
- The need to establish—through traffic control devices and highway design—distinctly different views for motorists approaching entrance and exit ramps
- Monitoring and intervention programs for wrong-way collisions
- Vehicle driver support systems

As a result of this investigation, the NTSB is issuing safety recommendations to the Federal Highway Administration; the National Highway Traffic Safety Administration; the states, the District of Columbia, and Puerto Rico; the American Association of State Highway and Transportation Officials; the Automotive Coalition for Traffic Safety; the International

Association of Chiefs of Police; the National Sheriffs' Association; SAE International; the Alliance of Automobile Manufacturers; Global Automakers; and the Consumer Electronics Association.

CONCLUSIONS

1. Although they are relatively rare highway occurrences, wrong-way collisions tend to be severe events resulting in fatalities, and the number of fatalities, averaging over 300 per year, has remained essentially unchanged in recent years.

2. Wrong-way collisions occur most often at night and during the weekends; they also tend to take place in the lane closest to the median.

3. Driving while impaired by alcohol is the primary cause of wrong-way driving collisions; more than 60 percent of wrong-way collisions are caused by drivers impaired by alcohol.

4. Alcohol impairment continues to be present in about one-third of all fatal highway accidents, resulting in more than 10,000 deaths per year.

5. New countermeasures to alcohol-impaired driving, as well as renewed emphasis at the federal, state, and local level, are needed.

6. The installation of alcohol ignition interlocks on the vehicles of all driving while intoxicated (DWI) offenders would reduce accidents caused by alcohol-impaired drivers.

7. The Driver Alcohol Detection System for Safety (DADSS) program is working to solve both technical and practical challenges to make it an acceptable alcohol detection system for widespread implementation in the US vehicle fleet.

8. Given that older drivers are over-represented in wrong-way collisions, efforts are needed to reduce the involvement of older drivers in wrong-way collisions.

9. Available data are inadequate to determine the extent of drug involvement in wrong-way driving.

10. Based on state sign inventory results and investigative examples, controlled-access highway exit ramp signs in some locations are not sized and placed in compliance with the current Federal Highway Administration *Manual on Uniform Traffic Control Devices*.

11. To reduce wrong-way errors, traffic control devices should be designed to make exit ramps readily distinguishable from entrance ramps; to some extent, this can be achieved by addressing signage, roadway marking, and roadway lighting.

12. Interchange design can influence the likelihood of wrong-way incursions, and states have experience with design changes that have proven effective in reducing wrong-way movements.

13. Individual state efforts have identified effective wrong-way driving countermeasures, but there is limited federal guidance for the use of proven strategies to prevent wrong-way driving.

14. Wrong-way monitoring programs provide an effective means of identifying wrong-way collision trends.

15. Most of the methods available to stop a wrong-way vehicle involve a high degree of risk and may put law enforcement officers and other motorists in jeopardy.

16. Providing navigation system alerts that inform drivers of wrong-way movements onto controlled-access highway exit ramps before they reach mainline traffic could enhance safety.

17. For wrong-way navigation alert systems to be reliable and effective, global positioning system (GPS) providers must follow consistent human factors policies in messaging and alerting.

Recommendations

As a result of this special investigation, the National Transportation Safety Board makes the following safety recommendations:

To the Federal Highway Administration:

1. Work with the National Highway Traffic Safety Administration to (1) identify efforts to reduce the involvement of older drivers in wrong-way collisions, and (2) publish the findings in a report that includes consideration of Strategic Highway Safety Plan countermeasures that have been effective.

2. Develop an assessment tool that the states can use to select appropriate countermeasures for problematic controlled-access highway locations, that is based on a review (1) of state research concerning wrong-way driving and (2) of the countermeasures found to be effective by the states in reducing the instances of wrong-way driving.

3. Develop and distribute to the states a manual they can use as a resource document when implementing strategies and countermeasures to reduce the instances of drivers traveling the wrong way on divided highways. At a minimum, such a manual should provide solutions that would (1) prevent drivers from entering an access ramp that would allow them to travel in the wrong direction on a divided highway, (2) alert drivers to their error should they enter a ramp while traveling in the wrong direction, (3) allow drivers to correct for traveling in the wrong direction while on an access ramp, and (4) alert drivers to their error if they are traveling the wrong way on a divided highway.

4. Revise the *Manual on Uniform Traffic Control Devices* as required to address issues of signage and channelization to reduce instances of, and warn drivers of, wrong-way movements.

5. Develop a Highway Safety Improvement Program policy memorandum for use by state department of transportation agencies to establish wrong-way monitoring programs.

To the National Highway Traffic Safety Administration:

6. Work with the Automotive Coalition for Traffic Safety to accelerate widespread implementation of Driver Alcohol Detection System for Safety (DADSS) technology by (1) defining usability testing that will guide driver interface design and (2) implementing a communication program that will direct driver education and promote public acceptance.

7. Work with the Federal Highway Administration to (1) identify efforts to reduce the involvement of older drivers in wrong-way collisions, and (2) publish the findings in a report that includes consideration of Strategic Highway Safety Plan countermeasures that have been effective.

To the 33 states that do not mandate the use of alcohol ignition interlock devices for all driving while intoxicated (DWI) offenders, the District of Columbia, and Puerto Rico:

8. Enact laws to require the use of alcohol ignition interlock devices for all individuals convicted of driving while intoxicated (DWI) offenses.

To the 50 states, the District of Columbia, and Puerto Rico:

9. Develop a comprehensive highway safety program for older drivers that incorporates, at a minimum, the program elements outlined in National Highway Traffic Safety Administration *Highway Safety Program Guideline No. 13—Older Driver Safety.*

To the American Association of State Highway and Transportation Officials:

10. Revise the *Policy on Geometric Design of Highways and Streets* as required to address issues of ramp design and pavement channelization in ways that will reduce instances of drivers traveling in the wrong direction as they enter access ramps.

To the Automotive Coalition for Traffic Safety:

11. Work with the National Highway Traffic Safety Administration to accelerate widespread implementation of Driver Alcohol Detection System for Safety (DADSS) technology by (1) defining usability testing that will guide driver interface design and (2) implementing a communication program that will direct driver education and promote public acceptance.

To the International Association of Chiefs of Police:

12. Work with the National Sheriffs' Association to develop a best practices document to provide guidance to law enforcement officers summoned to respond to a wrong-way movement on a divided highway.

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13. Work with the International Association of Chiefs of Police to develop a best practices document to provide guidance to law enforcement officers summoned to respond to a wrong-way movement on a divided highway.

To SAE International:

14. Work with the Alliance of Automobile Manufacturers, Global Automakers, and the Consumer Electronics Association, as well as other major global positioning system (GPS) industry representatives and stakeholders, to develop standards for GPS wrong-way navigation alerts.

To the Alliance of Automobile Manufacturers, Global Automakers, and the Consumer Electronics Association:

15. Work with SAE International to develop standards for global positioning system (GPS) wrong-way navigation alerts.

16. Inform your members of the benefits of incorporating wrong-way navigation alerts into global positioning system (GPS) navigation systems.