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National Transportation Safety Board

Washington, D.C. 20594-2000

Safety Recommendation

Log # H-641B

Date: NOV 23 2005

In reply refer to: H-05-28 through -30

Mr. Stephen E. Korta II
Commissioner
Connecticut Department of Transportation
2800 Berlin Turnpike
Newington, Connecticut 06131-7546

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your department to take action on the safety recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations address level-of-service (LOS) programs and roadway treatment, control of traffic through incident management areas, and incident management training. The recommendations are derived from the Safety Board's investigation of two January 17, 2003, accidents in Fairfield, Connecticut, and are consistent with the evidence we found and the analysis we performed.[1] As a result of this investigation, the Safety Board has issued six safety recommendations, three of which are addressed to the Connecticut Department of Transportation (ConnDOT). Information supporting the recommendations is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations.

On Interstate 95 (I-95) near Fairfield, Connecticut, two consecutive accidents occurred within 11 minutes in the early morning hours of January 17, 2003. About 4:50 a.m., a 1996 Freightliner tractor flatbed semitrailer, loaded with five portable compressor units, was involved in a nonfatal multivehicle accident. The truck was traveling in a work zone on I-95 north, near milepost 26.6, at a driver-estimated speed of 50 mph, when it slid out of control approximately 1,150 feet south of the exit 24 southbound off-ramp. The vehicle entered the median, overturned and overrode the portable concrete barrier, and collided with a southbound 1997 Dodge Avenger sedan. A southbound 2001 Freightliner tractor/refrigerated trailer combination unit struck the Dodge sedan and then struck the 1996 Freightliner tractor. The three vehicles came to rest blocking the southbound lanes of the highway. During the accident sequence, the flatbed semitrailer separated from the 1996 Freightliner tractor. The semitrailer came to rest

[1] For more information, read National Transportation Safety Board, *Multiple Vehicle Collision on Interstate 95, Fairfield, Connecticut, January 17, 2003*, Highway Accident Report NTSB/HAR-05/03 (Washington, DC: NTSB, 2005).

perpendicular to the roadway, straddling the portable concrete barrier and partially obstructing the left lane of I-95 north.

At 5:01 a.m., a 1999 Chevrolet Tahoe sport utility vehicle—occupied by nine students from Yale University and traveling north in the left lane—collided with and underrode the left side corner of the 1996 Freightliner tractor flatbed semitrailer. Following the impact, the Chevrolet disengaged from the semitrailer and entered the median, skidded along the concrete barrier, and came to rest about 450 feet northeast of the semitrailer. The driver and three passengers in the Chevrolet were fatally injured. The surviving occupants were seriously injured.

Witnesses reported that at the time of the accidents, light snow was falling, the roads were wet and icy, and snow covered the roadway shoulders.

The National Transportation Safety Board determined that the probable cause of the 4:50 a.m. accident was the 1996 Freightliner's loss of lateral stability, probably due to the operator driving too fast for conditions and to the presence of black ice on the roadway. Contributing to the accident were the inadequate roadway treatment provided by ConnDOT in response to inclement weather and also its failure to provide a median barrier capable of preventing crossovers by heavy vehicles. The probable cause of the 5:01 a.m. accident was the failure of the Chevrolet driver to identify and avoid the flatbed semitrailer due to fatigue, in conjunction with the distraction from the median crossover accident in the southbound lanes.

ConnDOT Maintenance District #3, section #33, Stratford maintenance facility, was responsible for treating the heavily traveled section of I-95 where the Fairfield accidents occurred. In the late evening of January 16, after being notified of a weather report calling for flurries and light snow with accumulations of up to 1 inch, the section #33 supervisor sent two trucks with a 7:2 sand and salt mixture to treat the roadway between exits 18 and 31. A 7:2 mixture is an application of 1,264 pounds of sand and 300 pounds of salt per two-lane mile.[2]

The ConnDOT *Snow and Ice Guidelines* state that a 7:2 sand and salt mixture can be used on multiple-lane roadways in lieu of straight salt when a complete assignment of trucks (100-percent coverage) has not been dispatched, which was the case for this event. Between 1:00 and 4:00 a.m. on January 17, the two trucks made two applications to the northbound and southbound lanes of I-95. Despite these roadway treatments, witnesses reported that they continued to experience hazardous driving conditions that morning, and some even reported that they saw no evidence that I-95 had been treated.

ConnDOT maintenance districts base roadway treatment decisions on the *Snow and Ice Guidelines*, which address only 100-percent coverage. The guidelines provide no written instructions for determining when conditions require full treatment versus lesser action, nor do they include information on 25- or 50-percent coverage applications. Lacking direction from the guidelines, the section #33 supervisor had to make a subjective decision about roadway treatment and coverage, and he may not have adequately considered the weather, traffic, and other roadway-related factors to ensure safety on I-95.

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[2] Connecticut Department of Transportation, *2003/2003 Snow and Ice Guidelines*, Bureau of Engineering and Highway Operations, Office of Maintenance (Hartford, CT: ConnDOT, 2002) 10.

Despite the roadway treatment ordered by the supervisor, as many as 18 other accidents reportedly occurred on I-95 in the vicinity of the Fairfield collisions between midnight and 4:50 a.m. on January 17. The persistence of such hazardous conditions suggests that, by failing to provide formal guidance, ConnDOT left the section #33 supervisor ill-equipped to make critical roadway snow and ice treatment decisions.

The American Association of State Highway and Transportation Officials (AASHTO) recommends that State highway maintenance officials responsible for snow and ice control treatment establish an LOS program for identifying and managing storms.[3] The ConnDOT *Snow and Ice Guidelines* cannot be considered an LOS program because they do not specify treatment strategies for different levels of storm severity.

Other highway authorities have determined that officials need more detailed guidance when making snow and ice treatment decisions. Both AASHTO and the Federal Highway Administration (FHWA) advocate that LOS programs provide such assistance. AASHTO recommends that State highway maintenance officials establish LOS programs to provide a framework for making treatment decisions. According to AASHTO, the LOS determination should be based on analyzing a number of preestablished factors, which may include road classification, traffic data, and available personnel and resources, as well as special circumstances and conditions affecting the roadway.

Both New York and Massachusetts have LOS programs. Under New York's regular LOS, precipitation with a high ice content, which was the case at the Fairfield accident area during the early morning hours of January 17,[4] would probably have called for an initial application of 225 pounds of straight salt per mile per lane. The New York LOS also provides guidance on follow-up applications, depending on various factors, including observation of conditions and the roadway's response to treatment.

The Massachusetts LOS program has three service conditions. Condition 2 would probably have applied to the situation on I-95 in the vicinity of the Fairfield accidents. The weather reports and observations for the Fairfield area indicated that temperatures were in the range of 20° F, with light precipitation, resulting in roadway ice. Condition 2 is defined as, "Air temperature 20 degrees Fahrenheit to 32 degrees Fahrenheit, pavement wet or icing precipitation, rain, snow, sleet, or freezing rain. Under this condition, ice is likely to form on the pavement."[5] For condition 2, the initial treatment specified is "straight chloride" or a mixture of calcium chloride and sodium chloride at the rate of 240 pounds per lane mile. The LOS also specifies additional action based on results of the initial application.

The Safety Board cannot definitively state that the applicable treatments specified under the New York and Massachusetts LOS programs would have sufficiently improved roadway conditions to have prevented the January 17 accidents along this section of I-95. However, both

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[3] See American Association of State Highway and Transportation Officials, *Guide for Snow and Ice Control* (Washington, DC: AASHTO, 1999) 81–82.

[4] New York State Department of Transportation, *Highway Maintenance Guidelines, Snow and Ice Control* (Albany, NY: NYSDOT, 1993) 19.

[5] See Massachusetts Highway Department, *Maintenance Manual*, chapter 5, division 4 (Boston, MA: 1996) 42.

of these State LOS programs would have identified icing as the main roadway problem and would have prescribed specific treatments. Had the ConnDOT *Snow and Ice Guidelines* included an LOS program addressing factors such as temperature, precipitation rate, and traffic flow, the supervisors may have made a more accurate assessment of roadway conditions and decided to employ more intensive or different treatments than the minimal application of a 7:2 sand and salt mixture.

The New York and Massachusetts LOS programs both provide guidance on reassessing and readdressing roadway conditions after the initial application. A written program based on LOS would have provided the ConnDOT supervisors with criteria for evaluating the effectiveness of treatment, which might have led to a modification in coverage. The maintenance crew drivers observed at least one weather-related accident during their runs, and the Connecticut State Police (CSP) reported that roadways continued to be slippery despite treatment. Had the ConnDOT *Snow and Ice Guidelines* included an LOS program calling for evaluation of the effectiveness of roadway treatment, the supervisors may have initiated 50-percent treatment coverage, rather than 25 percent. Such remedial action could have improved roadway conditions. The Safety Board concludes that a well-designed LOS program would have guided ConnDOT supervisors in selecting a predetermined treatment option designed to address specific roadway conditions, such as moderate snow and ice, and would have helped them evaluate the effectiveness of treatment.

Evidence suggests that the specific response measure ConnDOT selected—application of a 7:2 mixture of sand and salt—was not the optimal choice for the light snow and icy roadway conditions prevailing on I-95 near Fairfield in the early morning hours of January 17. According to AASHTO and the FHWA, abrasives only temporarily improve roadway traction because they are rapidly dispersed by traffic and can be covered by additional precipitation. AASHTO studies indicate that fewer applications of straight salt are required than of a mixture of abrasives and salt to achieve the same level of roadway improvement. Moreover, the FHWA *Manual of Practice for an Effective Anti-Icing Program* indicates that abrasives do not aid in deicing pavement and that combining abrasives with chemicals can reduce the efficiency of treatment.[6] As noted above, for the conditions that applied at Fairfield, both the New York and Massachusetts LOS programs would have called for the application of straight salt rather than a mix of abrasives and salt.

The snowfall on the night of January 16–17 was light, which probably influenced ConnDOT's decision to initiate minimum (25-percent) treatment coverage. However, over time, even light snowfall could have overlaid the 7:2 mixture and reduced the capacity of the sand to provide traction. Also, though traffic was not heavy during the early morning hours, the traveling speed was likely sufficient to rapidly disperse the minimal amount of 7:2 mixture applied. CSP transcripts and witness statements indicated that—despite roadway treatment—the pavement remained slippery and hazardous, and accidents continued to occur. The Safety Board concludes that the sand and salt mixture that ConnDOT used to treat the light-to-moderate snow and icy roadway conditions prevailing in the early morning hours of January 17 was not as effective as straight salt because such a mixture tends to be more rapidly dispersed by high-speed traffic. The Safety Board believes that ConnDOT should develop an LOS program in accordance with

[6] See <www.fhwa.dot.gov/reports/mopeap/mop0296a.htm> July 14, 2005.

AASHTO and FHWA guidance and incorporate the program elements, including a discussion of the limited usefulness of abrasives for roadway treatment, into the *Snow and Ice Guidelines*.

At 3:56 a.m. on the same day as the subject accidents, a vehicle overturned on I-95 north, about 400 feet northeast of where the 1996 Freightliner tractor flatbed semitrailer would override the median barrier and cross into the southbound lanes almost 1 hour later. An on-scene CSP officer stated that she had parked her patrol car behind the overturned vehicle and arranged five flares in a diagonal pattern in the left lane. After the first set of flares had burned out, the officer positioned two more flares behind her vehicle. This accident scene was cleared around 4:43 a.m., with the two flares still burning on the roadway.

According to the driver of the 2001 Freightliner involved in the 4:50 a.m. accident, the 1996 Freightliner driver stated that he had seen three flares on the northbound roadway and "panicked," which led to the accident. However, in interviews with Safety Board investigators, the 1996 Freightliner driver blamed black ice—and not the flares—for initiating the accident.

To explore the possibility that the flares played a role in this accident, the Safety Board examined whether the curvature of the roadway led the 1996 Freightliner driver to perceive the flares as being in his lane. Measurements of sight distance indicated that the driver would have been roughly 1,050 feet from the flares when they appeared to be directly in front of him. According to the driver, he was traveling about 50 mph at the time of the accident, or about 73 feet per second. Given these numbers, it would have taken him about 14 seconds to reach the flares, which was more than enough time to assess the situation and safely maneuver around the obstacle. However, the Safety Board cannot be certain when the driver saw the flares; in addition, situational factors—such as the absence of highway lighting,[7] weather conditions, and the state of the flares themselves—might have influenced his identification and perception of the flares. Even so, the CSP should have removed the flares from the 3:56 a.m. accident scene as part of prudent incident management protocol; leaving the flares to burn out posed a danger to motorists.

In the course of examining whether the flares contributed to the 4:50 a.m. accident, Safety Board investigators learned that the CSP did not have an incident management policy and did not train its officers on incident management procedures. Connecticut had adopted a two-page incident management policy in 1992 that called for coordination among State agencies, including ConnDOT and the Department of Public Safety, in which the CSP resides. However, the State did not develop an accompanying process or guidelines for the agencies to follow in the event of a traffic incident.

A formally documented management process that specifies the roles of each agency and the procedures to be followed under particular weather, traffic, and incident situations could lead to a swifter and safer response. Had such a process been in place on January 17, the CSP might have followed more thorough procedures for safely clearing the scene after the 3:56 a.m. accident, including properly disposing of the flares.

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[7] Highway lighting was not operational because of a construction accident that damaged the lighting circuits.

In November 2003, the national *Manual on Uniform Traffic Control Devices* (MUTCD) was amended to include a chapter on the control of traffic through incident management areas.[8] Among the primary functions of traffic incident management is to move road users quickly and safely around an incident and to reduce the likelihood of secondary traffic accidents. The new chapter contains guidelines for managing different levels of incidents, along with traffic control procedures to promote expediency and safety.

The process outlined in the MUTCD would be a useful addition to the Connecticut State Traffic Commission Regulations. This information would also help increase CSP awareness of proper incident management procedures. The Safety Board concludes that a formally documented incident management process would assist the CSP and other State agencies in more effectively conducting and coordinating activities and thereby reduce the occurrence of secondary accidents, such as the Chevrolet's collision with the 1996 Freightliner flatbed semitrailer. The Safety Board believes that ConnDOT should revise its State Traffic Commission Regulations to include the control of traffic through traffic incident management areas, as described in the MUTCD. Additionally, the Safety Board believes that ConnDOT should work with the Connecticut Department of Public Safety to provide coordinated training on traffic incident management for both its own staff and that of the CSP.

The National Transportation Safety Board therefore makes the following recommendations to the Connecticut Department of Transportation:

> Develop a level of service program in accordance with American Association of State Highway and Transportation Officials and Federal Highway Administration guidance and incorporate the program elements, including a discussion of the limited usefulness of abrasives for roadway treatment, into the *Snow and Ice Guidelines*. (H-05-28)
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> Revise your State Traffic Commission Regulations to include the control of traffic through traffic incident management areas, as described in the Federal Highway Administration *Manual on Uniform Traffic Control Devices*. (H-05-29)
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> Work with the Connecticut Department of Public Safety to provide coordinated training on traffic incident management for both your own staff and that of the Connecticut State Police. (H-05-30)

The Safety Board also issued safety recommendations to the Federal Highway Administration and to the American Association of State Highway and Transportation Officials. In addition, the Safety Board reiterated one recommendation to the Governor and legislative leaders of Connecticut.

In your response to this letter, please refer to Safety Recommendations H-05-28, H-05-29, and H-05-30. If you need additional information, you may call (202) 314-6177.

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[8] See Federal Highway Administration, *Manual on Uniform Traffic Control Devices (MUTCD)*, chapter 6I, section 6I.01 (Washington, DC: FHWA, 2003) 6I-1.

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS and HERSMAN concurred in these recommendations.

By: Mark V. Rosenker
Acting Chairman