



National Transportation Safety Board

Washington, D.C. 20594

Highway Accident Brief

This brief discusses two rear-end, chain-reaction collisions that occurred at the same location near North Hudson, New York. The first accident took place on February 22, 2004, and will be referred to as North Hudson I. The second accident, which will be referred to as North Hudson II, occurred on September 19, 2004.

North Hudson I Accident Facts

Accident No.: HWY-04-FH-015
Accident Type: Rear-end, chain-reaction collision
Location: Interstate Highway 87, near North Hudson, New York
Date and Time: February 22, 2004, about 2:40 p.m.
Vehicle 1: 1998 Prevost/Volvo 58-passenger motorcoach
Owner 1: AutoBus Bell Horizon, Incorporated
Injuries 1: 8 serious, 39 minor; 1 not injured
Vehicle 2: 1997 Kenworth truck-tractor with 2003 Manac semitrailer
Owner 2: Serge Lemay, Incorporated
Injuries 2: None
Vehicle 3: 2003 Chevrolet Tahoe sport utility vehicle
Owner 3: Private owner
Injuries 3: 4 minor
Vehicle 4: 1992 Chevrolet Corsica 4-door sedan
Owner 4: Private owner
Injuries 4: 2 minor; 1 not injured

North Hudson I Accident Description

On February 22, 2004, about 2:40 p.m., personnel from the U.S. Department of Homeland Security, U.S. Border Patrol (USBP), were conducting an immigration checkpoint on Interstate 87 (I-87) near North Hudson, New York, about 74 miles south of the Canadian border. Checkpoint operations required vehicles in both southbound traffic lanes to stop for an inspection and a brief driver interview. As a result, traffic became congested on I-87 southbound and had backed up approximately 900 feet north of the checkpoint. Two passenger vehicles followed by a Kenworth combination unit were stopped at the end of the queue in the right lane.

Meanwhile, a 1998 Prevost motorcoach carrying 47 passengers was approaching the area of congested traffic at a recorded speed of 64 mph¹ in the posted 65-mph zone. The motorcoach had departed earlier that day on a planned 2-day trip from St. Leonard d'Aston,² Quebec, to

¹ Obtained from a postaccident examination of the data recorded by the motorcoach's Detroit Diesel DDEC IV electronic engine recorder.

² St. Leonard d'Aston is a municipality in southern Quebec located about halfway between Quebec City and Montreal, Quebec.

Miami, Florida. The operator, a Canadian national with 15 years of driving experience, held a valid commercial driver's license (CDL)³ and began driving that morning at 8:15 a.m. The roadway was dry and clear, and, despite an overcast sky, visibility was good. The bus driver stated that when he first saw the rear of the Kenworth tractor-semitrailer, he thought that he was slowly catching up to it. He said he then momentarily looked in his rear view mirrors and, upon looking ahead, saw that he was rapidly advancing on the trailer. He said that he did not see any brake lights on the back of the trailer. Once he realized the trailer was not moving, the bus driver made a hard brake application to avoid colliding with the stopped combination unit. After skidding for 123 feet, the driver said he could not slow his vehicle in time to avoid the collision and swerved to the left as the motorcoach struck the rear of the Kenworth tractor-semitrailer. From the impact area, the Kenworth tractor-semitrailer was pushed forward about 120 feet, striking the rear of a 2003 Chevrolet sport utility vehicle and pushing it into the rear of a 1992 Chevrolet passenger car.

Eight motorcoach passengers sustained serious injuries. The driver and 38 passengers sustained minor injuries while one passenger was not injured. The driver of the combination vehicle was not injured. Of the seven occupants in the two passenger vehicles, six sustained minor injuries and one was not injured.

North Hudson II Accident Facts

Accident No.:	HWY-04-MH-038
Accident Type:	Rear-end, chain-reaction collision
Location:	Interstate Highway 87 at reference marker 1188, near North Hudson, New York
Date and Time:	September 19, 2004, about 2:26 p.m.
Vehicle 1:	2004 Peterbilt truck-tractor with 1978 Strick container chassis trailer
Owner 1:	Transport L.F.L., Inc., Vallee-Jonction, Quebec, Canada
Injuries 1:	1 serious
Vehicle 2:	1990 Honda Accord 4-door sedan
Owner 2:	Private owner
Injuries 2:	3 fatal
Vehicle 3:	1999 GMC Sierra pickup truck
Owner 3:	Private owner
Injuries 3:	1 serious
Vehicle 4:	1994 GMC pickup truck with 1983 Nomad camper trailer
Owner 4:	Private owner
Injuries 4:	1 fatal; 1 serious
Vehicle 5:	1994 Peterbilt truck-tractor semitrailer
Owner 5:	B & B Global Logistics, Inc., Greenfield Park, Quebec, Canada
Injuries 5:	None

³ Canadian CDL requirements are similar to U.S. CDL requirements except that Canadian applicants must physically inspect a vehicle during the road test (U.S. applicants need only answer questions regarding the inspection process). Further, unlike U.S. applicants, Canadian applicants must drive with a learner's permit for at least 3 months before the final CDL is issued, which entails restrictions such as only driving when accompanied by a 2-year licensed CDL driver and completing training that includes 300 hours of driving a tractor-semitrailer on a public roadway.

North Hudson II Accident Description

On September 19, 2004, about 2:26 p.m., personnel from the USBP were again conducting an immigration checkpoint on I-87 near North Hudson, New York, about 74 miles south of the Canadian border. Checkpoint operations required vehicles in both southbound traffic lanes to stop for an inspection and a brief driver interview. As a result, traffic became congested on I-87 southbound and had backed up approximately 807 feet north of the checkpoint. A 1994 Peterbilt combination unit and three passenger vehicles were stopped at the end of the queue in the right lane.

A 2004 Peterbilt truck-tractor, in combination with a 40-foot container chassis semitrailer, loaded with aluminum wire and operated by a 48-year-old truck driver, was approaching the checkpoint at a recorded speed of 59 mph⁴ in the posted 65-mph zone. The truck driver, a Canadian national, had departed Boucherville, Quebec, about 11:30 a.m. and had driven about 135 miles of an approximate 560-mile trip to York, Pennsylvania. He had driven this trip twice weekly since November 2003, using this same route on I-87 through northern New York. Reaching the queue of stopped vehicles at the checkpoint, the combination unit failed to stop and collided with a 1990 Honda passenger car. The Honda was pushed underneath a 1999 GMC pickup truck. The pickup truck was pushed off to the right, traveling about 100 feet, where it came to rest facing northbound off the west side of the interstate. The Honda continued forward and to the right, coming to rest approximately 94 feet from the impact area. The 2004 Peterbilt truck-tractor continued forward and collided with a 1994 GMC pickup truck that was towing a 29-foot Nomad camper trailer. The 1994 GMC pickup truck was pushed forward approximately 100 feet and came to rest at the right side of the 2004 Peterbilt truck-tractor. The 2004 Peterbilt combination unit that initiated the accident sequence traveled approximately 173 feet from the initial impact with the traffic queue to where it stopped in the roadway against the back of a 1994 Peterbilt combination unit. A postaccident fire burned the 1990 Honda, the 1994 GMC pickup truck and camper trailer, and the accident vehicle.

The occupants of the Honda were fatally injured; the driver of the 1994 GMC pickup truck was fatally injured. A passenger in the 1994 GMC pickup truck, the driver of the 1999 GMC pickup truck, and the driver of the 2004 Peterbilt truck-tractor all sustained serious injuries. The driver of the 1994 Peterbilt combination unit was not injured.

USBP Checkpoint Operations

In addition to the fixed inspection stations located along the international boundaries of the United States, the USBP employs other checkpoints⁵ within the zone of security to prevent the entry of illegal persons and drugs. (The zone of security, as defined by the Immigration and Nationality Act, extends inward for 100 air miles from any external boundary of the United States.) These checkpoints are in use in California, New York, Texas, and Vermont, with an additional checkpoint planned for Washington State. The USBP first began conducting 24-hour

⁴ The Engine Control Module (ECM) of the 2004 Peterbilt truck-tractor's Caterpillar engine had recording capabilities for quick-stop events (those exceeding 9 mph/second). The ECM data showed that the vehicle was traveling 59 mph for several seconds before its rapid deceleration (impact) and that the brake had not been applied for 15 seconds before impact.

⁵ The USBP refers to these checkpoints as "tactical deployment mobile stations."

checkpoint operations along I-87 in the North Hudson area in 1988. Initially, they were planned as short-term operations, lasting for 4 to 5 consecutive days and typically occurring less than six times during any given year. On December 29, 2003, in response to an elevated threat of terrorist activities, the USBP instituted a continuous operation in the North Hudson area designed to provide 24-hour coverage year-round.

The North Hudson checkpoint was situated within the southbound lanes of I-87 at the entrance to the High Peaks rest area. From this location, Border Patrol agents stopped all interstate traffic while conducting preliminary inspections and interviews with motorists. According to the USBP, agents required about 10 seconds, on average, to conduct each vehicle inspection. For more thorough examinations, vehicles were directed out of the traffic flow and into the rest area.

Checkpoint Traffic Control Devices

Besides the USBP checkpoint, the New York State Police (NYSP) also used the High Peaks rest area for commercial vehicle inspection and enforcement activities. The various uses of this facility resulted in a mixture of signs and flashing beacons being posted along the southbound interstate approaching the rest area. These signs included: 1) service signs notifying motorists of the rest area; 2) regulatory signs for vehicle speed, lane usage, and prohibited turning movements; and 3) warning signs regarding vehicle inspections and the requirement for vehicles to stop. (See figure 1.) Of the 12 signs posted in the 4 miles preceding the accident location, none gave specific notice of the USBP checkpoint.

Approximately 0.9 mile before the checkpoint, a sign displayed the message “Vehicle Inspection Ahead When Flashing.” This sign was used in combination with a flashing beacon, which was not flashing at the time of the North Hudson I accident but was at the time of the North Hudson II accident. Following this sign, 0.6 mile before the checkpoint, were a pair of “Stop Ahead” warning signs; slightly less than 0.1 mile later, approximately 0.5 mile from the checkpoint, motorists encountered a sign with the message “Trucks Must Stop When Flashing.” Unlike the first sign, the flashing beacon for this sign was working when the North Hudson I accident occurred. With the exception of the “All Trucks When Flashing” sign and another pair of “Stop Ahead” signs, all signs incorporating flashing beacons were located on the approach to the checkpoint *before* the collision site; the remaining signage was used to regulate vehicle lane position.

After the February accident, the USBP and the New York State Department of Transportation (NYSDOT) added signage along the approach to the checkpoint as follows:

- Changeable message sign that alternated between “Reduce Speed” and “Stop Ahead” (in median 4,780 feet before the checkpoint).
- “Traffic Stopped Ahead” sign (on right side of road and median 3,770 feet before the checkpoint).
- “Reduce Speed” sign (on right side of road and median 2,330 feet before the checkpoint).
- “Be Prepared to Stop” sign (on right side of road and median 913 feet before the checkpoint).

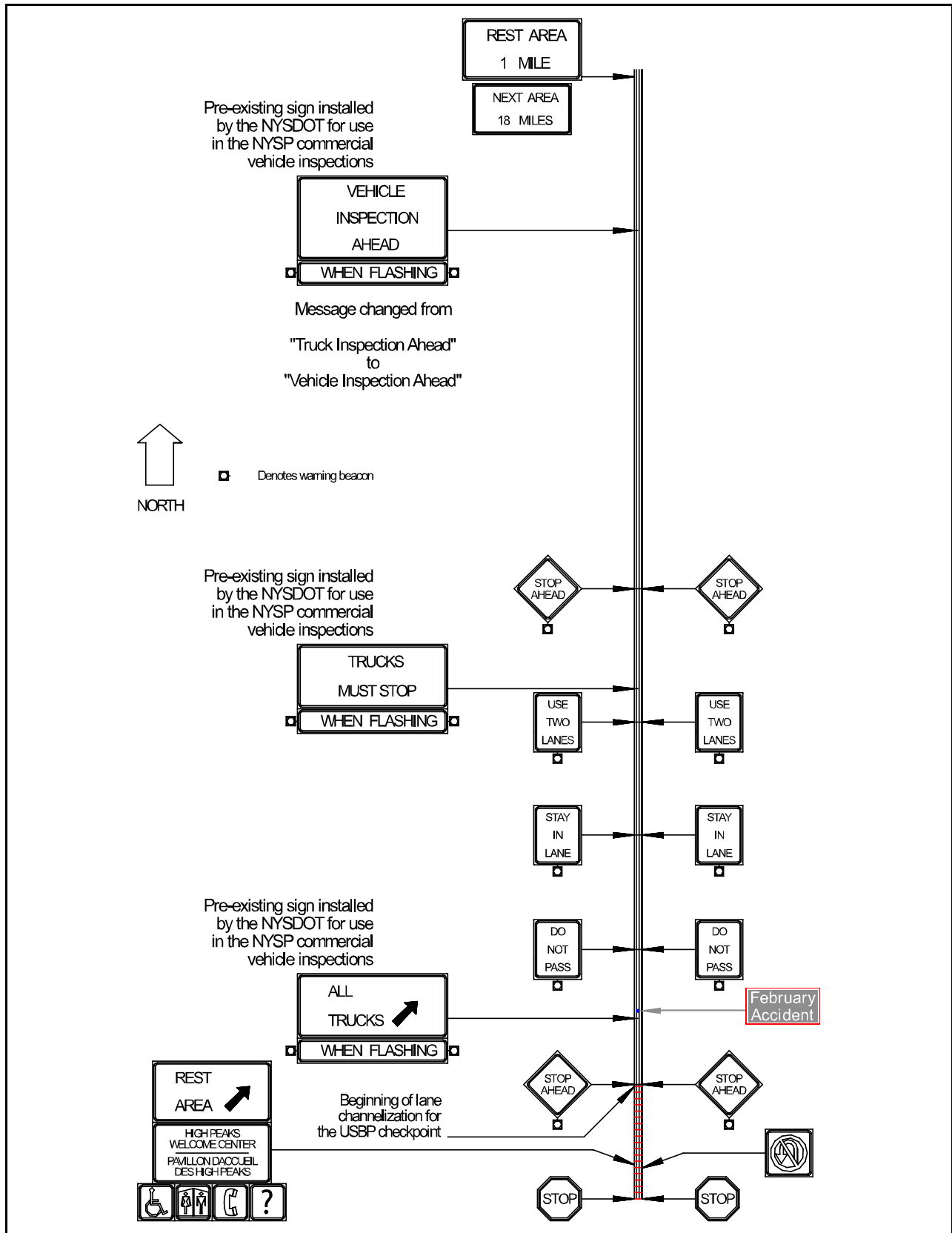


Figure 1. Signage at approach to USBP checkpoint on February 22, 2004.

The additional signage increased the number of signs to at least 25, none of which gave specific notice of the USBP checkpoint. (See figure 2.)

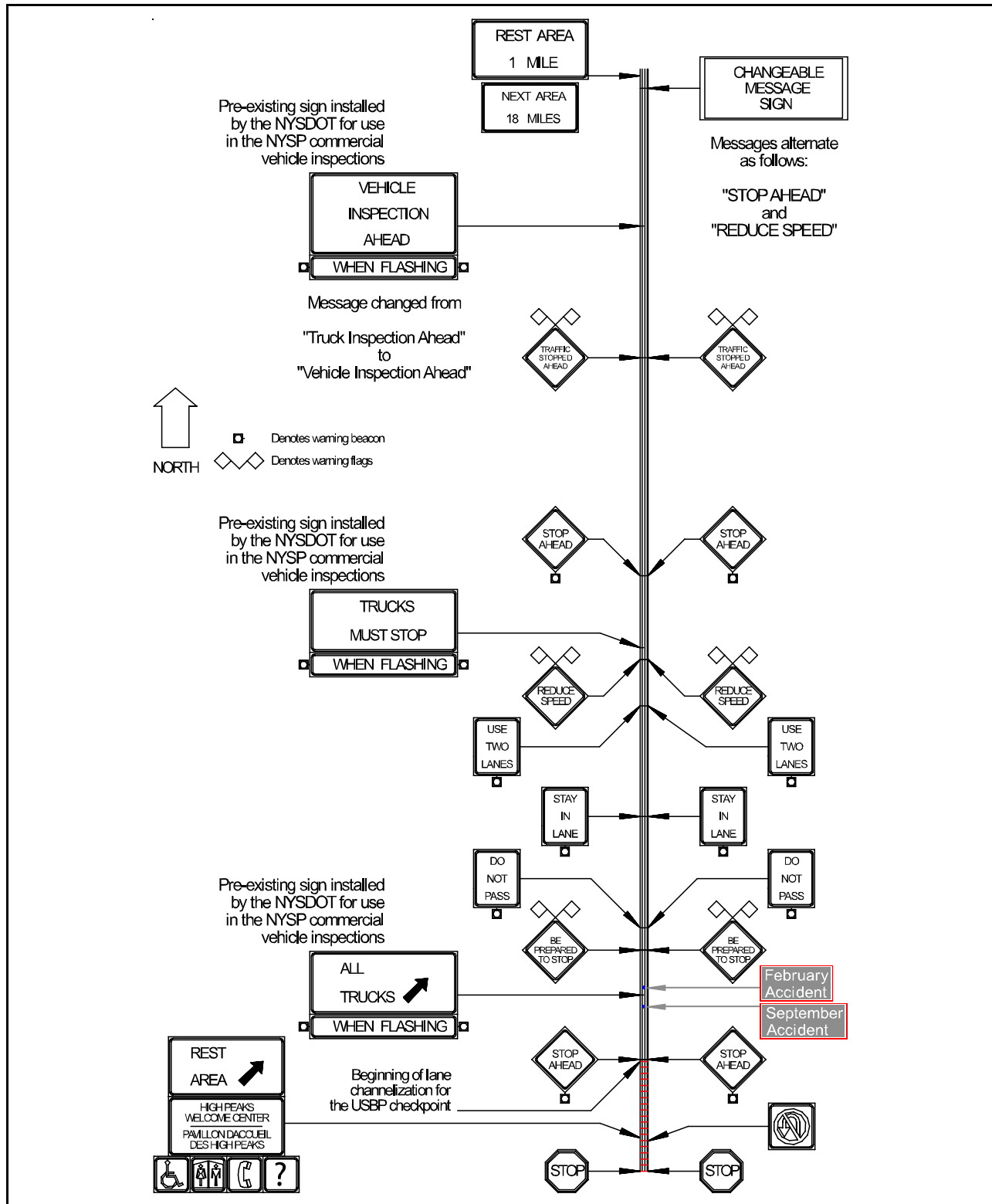


Figure 2. Signage at approach to USBP checkpoint on September 19, 2004.

Following the September accident, the USBP and the NYSDOT again added signage, bringing the total number of signs on the approach to the checkpoint to 29. The additional signage included the following:

- Changeable message sign that alternates between “Be Prepared to Stop” and “Stopped Traffic Ahead” (in median 2.6 miles prior to checkpoint).
- “Speed Zone Ahead” sign (on right side of road and median 2.2 miles prior to checkpoint).
- “Speed Limit 45” sign (on right side of road and median 2.0 miles, 1.8 miles, and 1.2 miles prior to checkpoint).
- Changeable message sign that alternates between “Speed Limit 45 MPH” and “Your Speed ___ MPH” (in median 1.1 miles prior to checkpoint).
- “Speed Limit 30” sign (on right side of road and median 3,300 feet and 2,138 feet prior to checkpoint).
- Symbol sign for stop ahead (on right side of road and median 3,036 feet prior to checkpoint).

In November 2004, the NYSDOT installed five sets of rumble strips about 1 mile before the checkpoint. The rumble strips and additional signage created a speed zone in which drivers must reduce their speed on approach to the USBP checkpoint but established no clear warning of the checkpoint—the reason vehicles would be stopped on the roadway ahead. (See figure 3.)

Guidance for Advance Warning Traffic Control Devices

The *Manual on Uniform Traffic Control Devices* (MUTCD) is the primary source of guidance used by transportation officials in establishing traffic control devices. Section 1A.02 of the MUTCD states that effective traffic control devices must fulfill a need; command attention; convey a clear, simple meaning; command respect from road users; and give adequate time for a proper response. The MUTCD addresses temporary traffic control (TTC) for use in work zones and in response to highway incidents but does not contain information specific to checkpoint operations on interstates. In August 1998, USBP personnel created initial TTC plans designating the type and placement of traffic control devices to be used before and at the checkpoint. The NYSDOT subsequently made several changes to the proposed plans, as shown in the table that follows, intended primarily to ensure that the wording used on the warning signs complied with *New York State Manual on Uniform Traffic Control Devices* guidelines. Additionally, the NYSDOT eliminated the proposed use of nonconforming flashing lights⁶ contained in the original proposal.

Initial TTC plan developed by the USBP	NYSDOT changes	Approximate distance from checkpoint
Top lights (emergency “police” flashers—strobe)	Removed	3,000 feet
Stop Ahead	[No change]	2,450 feet
Use Both Lanes	Use Two Lanes	1,850 feet
Slow Stay in Your Lane	Stay in Lane	1,250 feet
Slow No Passing	Do Not Pass	750 feet
Stop Ahead	[No change]	400 feet
Stop Signs and Red Light	Stop	Location of Border Patrol checkpoint

Once the USBP plan was approved in September 1998, the TTC plan for the checkpoint was applied to three existing NYSDOT signs installed for NYSP commercial vehicle inspections. As a result, the NYSDOT reworded the existing “Truck Inspection Ahead When Flashing” sign to read “Vehicle Inspection Ahead When Flashing.” The other signs specific to the NYSP commercial vehicle inspections, “Trucks Must Stop When Flashing” and “All Trucks When Flashing,” were left unchanged.

Although “Stop Ahead,” “Reduce Speed,” and speed limit signs were added to the TTC after the February and September 2004 accidents, motorists approaching the checkpoint had no clear advance warning that all vehicles, not just trucks, would be required to stop.

Prior Incidents at the North Hudson Checkpoint

Police accident reports from the New York State Department of Motor Vehicles showed that four minor, noninjury accidents had occurred at the North Hudson checkpoint in the 2 months from the time the USBP shifted to 24-hour/7-day-a-week coverage on December 29, 2003, until the February 22, 2004, accident. On January 6, 2004, a rear-end accident occurred before the entrance of the coned checkpoint area. On January 17, 2004, a vehicle entered the checkpoint at a high rate of speed; the driver applied the brakes, causing the vehicle to skid and

⁶ These included post-mounted yellow, red, and blue police-style strobe lights to be erected about 3,000 feet north of the checkpoint and a red light at checkpoint stop signs.

knock down 10 cones and a USBP emergency light. On January 19, 2004, a rear-end accident occurred when a vehicle collided with another vehicle already stopped at the checkpoint. On February 6, 2004, a vehicle lost control and veered off the right shoulder, striking a snowbank and going over the top of the guiderail cables. The report from the January 6 accident stated that all traffic controls were in effect and functioning prior to the checkpoint location; the subsequent reports did not mention the condition of the traffic controls.

North Hudson II Peterbilt Truck Driver Information

On March 9, 2005, the Peterbilt truck driver from the North Hudson II accident underwent a polysomnography (sleep study) at the Laboratoire Médical Biron in St. Lambert, Quebec, Canada. The study, which consisted of a questionnaire and 7.5 hours of data recording, showed that the driver had mild obstructive sleep apnea and alveolar hypoventilation syndrome of the obese, also known as obesity-hypoventilation syndrome. Obesity-hypoventilation syndrome, often associated with mild or moderate sleep apnea, is seen in obese individuals who do not respond to increased blood carbon dioxide levels with increased respiration sufficient to maintain normal low blood carbon dioxide and high blood oxygen levels.⁷ This condition can cause hypoxia (oxygen deprivation), which may considerably degrade cognitive functioning. The results of the study were also consistent with sleep deprivation.

Probable Cause

The National Transportation Safety Board determines that the probable cause of these accidents was the failure of the United States Border Patrol and the New York State Department of Transportation to provide adequate warning of the checkpoint's presence in the southbound lanes of the interstate and to convey a clear, simple message that all vehicular traffic would be required to stop for the checkpoint. Contributing to the North Hudson I accident was the failure of the motorcoach driver to identify the excessive closure rate between his vehicle and the slowed or stopped traffic at the end of the queue. Contributing to the North Hudson II accident was the truck driver's failure to react to the line of stopped vehicles at the checkpoint, most likely caused by degraded cognitive functioning as a result of his obesity-hypoventilation syndrome and sleep deprivation.

Previously Issued Recommendations

As a result of the North Hudson I and II accidents, the National Transportation Safety Board issued the following recommendations on October 21, 2004, to the Federal Highway Administration (FHWA):

H-04-32

Assist the American Association of State Highway and Transportation Officials and the U.S. Bureau of Customs and Border Protection in immediately developing comprehensive traffic control guidelines specifically tailored to U.S. Border Patrol checkpoints located on high-speed arterial roadways. **(Urgent)**

⁷ E.A. Philipson, "Disorders of Ventilation," *Harrison's Principles of Internal Medicine*, 16th edition, ed. Dennis L. Kasper and others (New York: McGraw-Hill, 2004), chapter 246.

H-04-33

Incorporate, in cooperation with the American Association of State Highway and Transportation Officials, the guidelines referred to in Safety Recommendation H-04-32 into the *Manual on Uniform Traffic Control Devices*.

Safety Recommendations H-04-32 and -33 were classified “Open—Acceptable Response” on March 18, 2005.

As a result of the North Hudson I and II accidents, the National Transportation Safety Board issued the following recommendation on October 21, 2004, to the U.S. Bureau of Customs and Border Protection:

H-04-34

Assist the Federal Highway Administration and the American Association of State Highway and Transportation Officials in immediately developing comprehensive traffic control guidelines specifically tailored to U.S. Border Patrol checkpoints located on high-speed arterial roadways and use those guidelines, once developed, as a basis for implementing traffic control at checkpoints nationwide. **(Urgent)**

Safety Recommendation H-04-34 was classified “Open—Acceptable Response” on April 27, 2005.

As a result of the North Hudson I and II accidents, the National Transportation Safety Board issued the following recommendations on October 21, 2004, to the American Association of State Highway and Transportation Officials (AASHTO):

H-04-35

Immediately develop, with the assistance of the Federal Highway Administration and the U.S. Bureau of Customs and Border Protection, comprehensive traffic control guidelines specifically tailored to U.S. Border Patrol checkpoints located on high-speed arterial roadways. **(Urgent)**

H-04-36

Assist the Federal Highway Administration in incorporating the guidelines referred to in Safety Recommendation H-04-35 into the *Manual on Uniform Traffic Control Devices*.

Safety Recommendations H-04-35 and -36 remain classified “Open—Await Response.”

Post-Recommendation Actions

Since October 2004, the USBP has been coordinating with the FHWA and AASHTO to develop traffic control guidelines for USBP checkpoints. Specifically, the USBP, the NYSDOT, the NYSP, and the FHWA further refined the traffic controls on I-87 approaching the North

Hudson checkpoint; many issues detailed in the Safety Board's recommendations concerning the site have been addressed. Resulting improvements include the following:

- Installation of rumble strips, speed limit signs, and electronic signs that notify motorists of their current speed.
- Extension of checkpoint signage from 1 mile to 2.6 miles north of the I-87 checkpoint.
- Removal of signage considered excessive by the Safety Board from the current traffic control plan.
- Increase in NYSP enforcement presence at the I-87 checkpoint to improve driver attention and reduce speeding.
- Issuance of a directive by USBP headquarters to all USBP sectors that operate traffic checkpoints to coordinate with their respective State Departments of Transportation (DOTs) to ensure that all checkpoints are using the required traffic safety control devices in compliance with guidelines recommended by their State DOTs.

AASHTO, the USBP, and the FHWA have also actively participated in a special task force to develop recommendations for traffic controls for Border Patrol checkpoints. As a result, in July 2005, the National Committee on Uniform Traffic Control Devices issued three typical application drawings and corresponding guidance for traffic controls at USBP traffic checkpoints. The Board is currently evaluating this guidance for its responsiveness to Safety Recommendations H-04-32 through -36.

By 2007, the FHWA plans to publish a Notice of Proposed Rulemaking to amend the MUTCD with new standards, guidance, and/or options for USBP high-speed arterial traffic checkpoints; the revised MUTCD is expected to be published in 2008. Additionally, a Traffic Safety Group has been established to address specific issues of joint concern, enhance national security efforts, and ensure the safety of the traveling public.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

MARK V. ROSENKER
Acting Chairman

DEBORAH A. P. HERSMAN
Member

ELLEN ENGLEMAN CONNERS
Member

Adopted: October 17, 2005