Collision Between Pickup Truck with Trailer and Group of Motorcycles
Randolph, New Hampshire
June 21, 2019

Accident Report

NTSB/HAR-20/04
PB2020-101014

National Transportation Safety Board

National Transportation Safety Board. 2020. *Collision Between Pickup Truck with Trailer and Group of Motorcycles, Randolph, New Hampshire, June 21, 2019*. Highway Accident Report NTSB/HAR-20/04. Washington, DC.

Abstract: About 6:26 p.m. eastern daylight time on Friday, June 21, 2019, a 2016 Ram 2500 Tradesman crew-cab pickup truck towing an unladen 2015 Quality vehicle-hauling trailer, operated by Westfield Transport Incorporated and driven by a 23-year-old male, was traveling west on US Route 2 (US-2) in Randolph, Coos County, New Hampshire. The combination vehicle had left its last delivery stop in Gorham, New Hampshire, about 17 minutes earlier, and was en route to West Springfield, Massachusetts. A group of 15 motorcycles—carrying 15 riders and 7 passengers—traveling in staggered formation had just entered the eastbound lane of US-2 from a driveway opposite the intersection with Valley Road. In this area, US-2 is a two-lane road that is divided by a double yellow centerline and has a speed limit of 50 mph. About 1,100 feet east of Valley Road, the combination vehicle, which had crossed the centerline, collided with the motorcycle leading the staggered formation and then struck another motorcycle. The vehicle then continued in a sharper leftward arc, colliding with four additional motorcycles, before coming to rest on an earthen embankment along the eastbound shoulder. A postcrash fire ensued that enveloped the pickup truck and two of the motorcycles. Five motorcycle riders and two passengers died in the crash, and an additional five riders and two passengers were injured. The pickup truck driver was not injured.

From its investigation of this crash, the National Transportation Safety Board (NTSB) identified the following safety issues:

- Deficiencies in out-of-state driver's license notification processing,
- Insufficient federal oversight of motor carriers, and
- Shortcomings in motorcycle rider safety.

On the basis of its findings, the NTSB makes safety recommendations to the Federal Motor Carrier Safety Administration; the National Highway Traffic Safety Administration; the Massachusetts Department of Transportation; 49 states, Washington, DC, and four territories; the National Association of State Motorcycle Safety Administrators; and the Motorcycle Safety Foundation.

NOTE: This report was reissued on March 30, 2021, because the NTSB changed the recipients of Safety Recommendation H-20-38 from state departments of transportation to the states themselves. The revisions were made to pages xiii, 63, and 68.

NTSB/HAR-20/04
PB2020-101014
Notation 65308
Adopted December 1, 2020

Highway Accident Report

Collision Between Pickup Truck with Trailer and Group of Motorcycles
Randolph, New Hampshire
June 21, 2019

National Transportation Safety Board

490 L'Enfant Plaza SW
Washington, DC 20594

Contents

Figures and Tables

Acronyms and Abbreviations

6-MAM	6-monoacetylmorphine
AAMVA	American Association of Motor Vehicle Administrators
ABS	antilock braking system
AOBRD	automatic onboard recording device
BAC	blood alcohol concentration
BASIC	behavior analysis and safety improvement categories (FMCSA)
CDL	commercial driver's license
CDLIS	commercial driver's license information system
CFR	*Code of Federal Regulations*
CR	compliance review
DEA	Drug Enforcement Administration
DLC	driver license compact
DMV	Department of Motor Vehicles
DOT	Department of Transportation
DQ	driver qualification
DUI	driving under the influence
ELD	electronic logging device
EMS	emergency medical service
FMCSA	Federal Motor Carrier Safety Administration
FMVSS	*Federal Motor Vehicle Safety Standard*
g/dL	grams per deciliter
GFD	Gorham Fire Department
GPD	Gorham Police Department
GPS	global positioning system

GVWR	gross vehicle weight rating
HOS	hours of service
IC	incident commander
IIHS	Insurance Institute for Highway Safety
IH	imminent hazard
MCMIS	Motor Carrier Management Information System (FMCSA)
MCSAP	Motor Carrier Safety Assurance Program
MRB	Merit Rating Board (Massachusetts Registry of Motor Vehicles)
NDR	National Driver Register
ng/mL	nanograms per milliliter
NHSP	New Hampshire State Police
NHTSA	National Highway Traffic Safety Administration
NRVC	nonresident violator compact
NTSB	National Transportation Safety Board
OOS	out of service
RMV	Massachusetts Registry of Motor Vehicles
RVFD	Randolph Volunteer Fire Department
S2S	state-to-state verification service
US-2	US Route 2
USDOT	US Department of Transportation
VIN	vehicle identification number

Executive Summary

Crash Summary

About 6:26 p.m. eastern daylight time on Friday, June 21, 2019, a 2016 Ram 2500 Tradesman crew-cab pickup truck towing an unladen 2015 Quality vehicle-hauling trailer, operated by Westfield Transport Incorporated and driven by a 23-year-old male, was traveling west on US Route 2 (US-2) in Randolph, Coos County, New Hampshire. The combination vehicle had left its last delivery stop in Gorham, New Hampshire, about 17 minutes earlier, and was en route to West Springfield, Massachusetts.[1]

A group of 15 motorcycles—carrying 15 riders and 7 passengers—traveling in staggered formation had just entered the eastbound lane of US-2 from a driveway opposite the intersection with Valley Road. In this area, US-2 is a two-lane road that is divided by a double yellow centerline and has a speed limit of 50 mph.

About 1,100 feet east of Valley Road, the combination vehicle, which had crossed the centerline, collided with the motorcycle leading the staggered formation and then struck another motorcycle. The vehicle then continued in a sharper leftward arc, colliding with four additional motorcycles, before coming to rest on an earthen embankment along the eastbound shoulder. A postcrash fire ensued that enveloped the pickup truck and two of the motorcycles. Five motorcycle riders and two passengers died in the crash, and an additional five riders and two passengers were injured. The pickup truck driver was not injured.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the Randolph, New Hampshire, crash was the pickup truck driver's crossing the centerline and encroaching into the oncoming lane of travel, which occurred because of his impairment from use of multiple drugs. Contributing to the crash was Westfield Transport's substantial disregard for and egregious noncompliance with safety regulations. Also contributing was the failure of the Massachusetts Registry of Motor Vehicles to revoke the pickup truck driver's Massachusetts driver's license when notified of his loss of driving privileges in another state.

Safety Issues

The investigation identified the following safety issues:

- ***Deficiencies in out-of-state driver's license notification processing.*** At the time of the crash, the Massachusetts Registry of Motor Vehicles (RMV) had serious deficiencies in processing out-of-state notifications, which led to the RMV's failure to revoke the commercial driver's license (CDL) of the pickup truck driver as well as the driver's

[1] For more information, see the factual information and analysis sections of this report. Additional information about the investigation of this crash (NTSB case number HWY19MH010) can be found by accessing the Docket Management System at www.ntsb.gov. For more information on our safety recommendations, see the Safety Recommendation Database at www.ntsb.gov.

licenses of thousands of non-CDL drivers in Massachusetts. After the Randolph crash, the RMV made considerable operational and management changes. The report explores the RMV's deficiencies that led to the crash, the postcrash changes, and the extent to which the problems observed in Massachusetts exist nationwide.

- ***Insufficient federal oversight of motor carriers.*** Westfield Transport was an unsafe motor carrier that failed to complete even the most fundamental task a motor carrier is required to accomplish—to ensure that it employs properly qualified drivers. The carrier's managers and drivers also routinely tampered with electronic logging devices (ELDs) and falsified hours-of-service logs. Examination of Westfield Transport's history showed limitations in the Federal Motor Carrier Safety Administration (FMCSA) oversight of carriers that are recent graduates of the agency's new entrant program. The report explores Westfield Transport deficiencies that led to the crash, and the FMCSA's oversight of motor carriers that recently completed the new entrant program, its oversight of ELD providers, and its use of imminent hazard orders.

- ***Shortcomings in motorcycle rider safety.*** Four of the motorcycles in the Randolph crash were equipped with an antilock braking system (ABS), which would have helped the riders maintain stability while emergency braking. However, the technology is not required equipment on new motorcycles. In addition, several of the motorcycle riders had alcohol in their blood, and a few riders and passengers were not wearing a US Department of Transportation (USDOT)-compliant helmet at the time of the crash. Because the riders entered the roadway mere seconds before the crash, the spacing between the motorcycles in the still-developing staggered formation was very tight. The report explores (1) the impact of ABS on the motorcycles in this crash and the overall safety benefit of such technology on an entire motorcycle fleet, (2) the overall safety of wearing USDOT-compliant helmets, and (3) the risks of alcohol impairment and inadequate spacing between motorcycles while riding in groups.

Findings

1. None of the following were factors in the crash: (1) driving experience of the pickup truck driver and motorcycle riders; (2) cell-phone distraction by the pickup truck driver; (3) mechanical condition of the combination vehicle and the motorcycles; (4) highway design; and (5) weather conditions.

2. The emergency response to the crash was timely and appropriate.

3. The pickup truck driver's crossing of the centerline occurred because of his impairment from use of multiple drugs.

4. Due to systemic deficiencies in the Massachusetts Registry of Motor Vehicles (RMV) operations and inaction to rectify a known problem, the RMV failed to revoke the pickup truck driver's commercial driver's license (CDL) as well as the licenses of many non-CDL Massachusetts drivers with infractions or suspensions in other states.

5. Had the Massachusetts Registry of Motor Vehicles had effective systems in place to promptly revoke driver's licenses based on out-of-state notifications, the pickup truck driver's license would have been revoked before the Randolph crash.

6. Postcrash system changes by the Massachusetts Registry of Motor Vehicles (RMV) represent progress toward addressing the substantial deficiencies in RMV operations that existed at the time of the crash.

7. If the postcrash system changes by the Massachusetts Registry of Motor Vehicles are maintained, they would reduce the likelihood of drivers with a history of impaired driving retaining a Massachusetts driver's license.

8. Considering the problems uncovered in Massachusetts and neighboring states, the process for revoking the licenses of commercial driver's license (CDL) and non-CDL drivers with disqualifying offenses could be greatly enhanced by improving interstate communication, including promptly sending notifications to other states and expeditiously processing incoming out-of-state notifications.

9. By failing to conduct an appropriate background check and safety history on the pickup truck driver, Westfield Transport exhibited a substantial disregard for federal motor carrier safety regulations, resulting in hiring and employing a driver with significant safety risks.

10. Westfield Transport's egregious noncompliance with federal motor carrier safety regulations and its actions to conceal its deceptive practices indicate a motor carrier without regard for safety.

11. Although the Federal Motor Carrier Safety Administration's new entrant safety assurance program functioned as designed and did not detect violations by Westfield Transport during the probationary period that merited an expedited action, the program—due to its inherent limitations—could not predict Westfield Transport's subsequent unsafe operation.

12. Recent graduates of the Federal Motor Carrier Safety Administration's new entrant safety assurance program that exhibit a dramatic increase in roadside inspections and subsequent violations demonstrate that the safety of their operation has been compromised.

13. Based on two recent National Transportation Safety Board investigations in which drivers were able to easily manipulate KeepTruckin logging devices to falsify hours of service, these devices do not appear to be in compliance with federal regulations.

14. By deciding not to issue an imminent hazard order against Westfield Transport, the Federal Motor Carrier Safety Administration missed an opportunity to improve safety by preventing the carrier's owner, manager, and drivers from continuing their unsafe practices, possibly with the same vehicles, by reincarnating into other carriers.

15. The Federal Motor Carrier Safety Administration inconsistently applies imminent hazard orders, which can be an effective tool for removing unsafe motor carriers from service and preventing owners, managers, and drivers from continuing their unsafe practices, frequently with the same vehicles, by reincarnating into other carriers.

16. The antilock braking systems on four of the motorcycles likely aided those riders in performing emergency braking during the crash sequence.

17. Because antilock braking systems can aid motorcycle riders when braking in emergency situations, broad deployment of the technology would reduce the crash risk for motorcycle riders.

18. Although the effectiveness of helmet use in this crash for each motorcyclist could not be conclusively determined, US Department of Transportation (USDOT)-compliant helmets have been shown to provide the best protection for motorcyclists when a crash occurs, and state universal helmet-use laws increase the use of USDOT-compliant helmets in those states.

19. Although the lead rider was impaired by alcohol, the extent to which his impairment impeded his ability to execute an evasive maneuver could not be determined.

20. Although alcohol impairment increases a motorcycle rider's response time to a potential hazard, the rapid progression of impacts in this crash along with the tight spacing made it unlikely for most riders behind the lead motorcycle to be able to avoid the oncoming pickup truck.

Recommendations

New Recommendations

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

To the Federal Motor Carrier Safety Administration:

Establish an additional layer of oversight of recent graduates of your new entrant safety assurance program that has a lower tolerance for unsafe operations. (H-20-34)

Remove KeepTruckin electronic logging devices from the list of approved providers until the company has demonstrated compliance with federal regulations. (H-20-35)

Review and revise the certification process by which your agency approves electronic logging device providers to ensure that products meet federal regulations. (H-20-36)

To the Massachusetts Department of Transportation:

Develop appropriate metrics and establish a process to regularly evaluate the effectiveness of the Registry of Motor Vehicles' processing of out-of-state notifications, both incoming and outgoing, for commercial driver's license (CDL) and non-CDL holders. (H-20-37)

To 49 states—Massachusetts excepted—and the District of Columbia and the Commonwealth of Puerto Rico:

> Direct your state licensing agencies to review existing procedures or develop new ones to accurately and expeditiously (1) process notifications received from other states about infractions and suspensions committed by the home state's drivers in those jurisdictions, and (2) notify other jurisdictions of infractions and suspensions committed in the home state by drivers licensed in those jurisdictions. (H-20-38)

To the National Association of State Motorcycle Safety Administrators and the Motorcycle Safety Foundation:

> Inform your members about this crash and remind them about the safety benefits of wearing US Department of Transportation-compliant helmets, safe spacing when riding in groups, riding unimpaired, and antilock braking system-equipped motorcycles. (H-20-39)

Previously Issued Recommendations Reiterated in this Report

The National Transportation Safety Board also reiterates the following safety recommendations:

To the National Highway Traffic Safety Administration:

> Require all new motorcycles manufactured for on-road use in the United States be equipped with antilock braking system technology. (H-18-32)

This recommendation is reiterated in section 2.4.1 of this report.

To the three states with no motorcycle helmet laws (Illinois, Iowa, and New Hampshire):

> Require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-38)

This recommendation is reiterated in section 2.4.2 of this report.

To the 27 states/commonwealths and one territory with partial motorcycle helmet laws (Alaska, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Hawaii, Idaho, Indiana, Kansas, Maine, Minnesota, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Texas, Utah, Wisconsin, and Wyoming; the commonwealths of Kentucky and Pennsylvania; and the territory of Guam):

> Amend current laws to require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-39)

This recommendation is reiterated in section 2.4.2 of this report.

To the seven states/commonwealths, the District of Columbia, and two territories with universal motorcycle helmet laws/regulations not specifically requiring FMVSS 218-compliant helmets (Alabama, Maryland, Michigan, Mississippi, Nevada, and West Virginia; the commonwealth of Virginia; the District of Columbia; and the territories of Northern Mariana Islands and the Virgin Islands of the United States):

> Amend current laws to specify that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-40)

This recommendation is reiterated in section 2.4.2 of this report.

Previously Issued Recommendation Reiterated and Classified in this Report

The National Transportation Safety Board also reiterates and classifies the following safety recommendation:

To the Federal Motor Carrier Safety Administration:

> Review the process and procedures for imminent hazard orders to identify ways in which this process can be improved to work more swiftly and effectively; when implementing the improvements, seek legislative authority for such changes as necessary. (H-16-1)

This recommendation is reiterated and classified "Open—Unacceptable Response" in section 2.3.4 of this report.

1

1. Factual Information

1.1 Crash Narrative

About 6:26 p.m. eastern daylight time on Friday, June 21, 2019, a 2016 Ram 2500 Tradesman crew-cab pickup truck towing an unladen 2015 Quality vehicle-hauling trailer, operated by Westfield Transport Incorporated and driven by a 23-year-old male, was traveling west on US Route 2 (US-2) in Randolph, Coos County, New Hampshire. The combination vehicle had left its last delivery stop in Gorham, New Hampshire, about 17 minutes earlier, and was en route to West Springfield, Massachusetts.

About this time, a group of 15 motorcycles carrying 15 riders and 7 passengers traveling in staggered formation had just departed the Mount Jefferson View Inn, located at the intersection of Valley Road and US-2 (see figure 1). As the motorcyclists entered the eastbound lane of US-2 on their way to Gorham, the combination vehicle approached the Valley Road intersection. Through this area, US-2 is a two-lane road that is separated by a double yellow centerline and has a speed limit of 50 mph.

Figure 1. Aerial view of crash location, showing the direction of travel of the combination vehicle and the motorcycles. (Source: Adapted from Google Earth)

About 1,100 feet east of Valley Road, the combination vehicle, which had crossed the centerline of US-2 into the eastbound lane, collided with the motorcycle leading the staggered formation. As the combination vehicle continued farther into the eastbound lane, it collided with a second motorcycle (additional details of the collision sequence are located in section 1.5 of this report). The pickup truck and its trailer then sharply arced leftward, crossing the eastbound lane

and directly striking four additional motorcycles. The combination vehicle came to rest on an earthen embankment along the eastbound shoulder, at which point a fire ensued that enveloped the pickup truck and the last two impacted motorcycles (see figure 2). The crash occurred in daylight, and the road surface was dry.

Figure 2. At-rest positions of the pickup truck and two of the motorcycles (left); the trailer (right). (Source: New Hampshire State Police)

Two motorcycles at the end of the formation were not involved in the crash sequence—they were not damaged and their riders and passengers were not injured (see section 1.2 for crash injury information). The report therefore focuses on the 13 motorcycles at the front of the formation. All 13 of them were manufactured by Harley Davidson, ranging in model year from 1998 to 2019 (see section 1.4 for further description of the motorcycles).

1.2 Injuries and Emergency Response

1.2.1 Injuries

As a result of this crash, five motorcycle riders and two passengers died, one rider sustained serious injuries, four riders and two passengers received minor injuries, and three riders and one passenger were uninjured. The pickup truck driver was also uninjured. The motorcycle riders and passengers ranged in age from 42 to 70, with 12 males and 6 females. Based on the autopsy reports, the five deceased motorcycle riders and two passengers sustained blunt-force trauma to multiple body regions. The rider leading the formation sustained severe blunt-force trauma to his head and died as a result of that injury; the other six riders and passengers died as a result of multiple blunt-force injuries. Three of the riders and passengers who died also sustained thermal injuries.[1]

The one seriously injured rider had leg fractures, abrasions, and dislocations. The four riders and two passengers with minor injuries sustained abrasions, contusions, and lacerations to multiple body regions and extremities. Table 1 summarizes the distribution of injury severity.

Table 1. Injury levels for the motorcycle riders and passengers and the pickup truck driver.

[1] Thermal injuries were sustained by the riders in positions 8 and 11 and the passenger in position 10. See figure 3 for the positions of all riders and passengers along with their injury level.

Injuries					
Persons	**Fatal**	**Serious**	**Minor**	**None**	**Total**
Pickup truck driver	--	--	--	1	1
Motorcycle occupants					
Riders	5	1	4	3	13
Passengers	2	--	2	1	5
TOTAL	7	1	6	5	19

[a] Although 49 *Code of Federal Regulations* (CFR) Part 830 pertains to the reporting of aircraft accidents and incidents to the NTSB, section 830.2 defines fatal injury as any injury that results in death within 30 days of the accident, and serious injury as any injury that (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date of injury; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burn affecting more than 5 percent of the body surface.

In an interview with the New Hampshire State Police (NHSP), the pickup truck driver stated that he was wearing a lap/shoulder seat belt. The seat belts were destroyed in the postcrash fire, and the seatbelt latch and buckle were not found in the debris. Based on interviews with the surviving riders and evidence examination, National Transportation Safety Board (NTSB) investigators determined the probable position of the riders in the traveling formation (see figure 3) and ascertained the use of helmets. Of the 11 surviving riders and passengers, nine (six riders and three passengers) were wearing a US Department of Transportation (USDOT)-compliant helmet, one rider was wearing a non-USDOT-compliant helmet, and helmet use for the remaining surviving rider is unknown.[2] Of the deceased riders and passengers, three were wearing USDOT-compliant helmets (two riders and one passenger); the rider at the front of the formation most likely was not wearing a helmet; and the helmet use of the remaining two riders and one passenger is unknown.[3] New Hampshire does not require motorcycle riders or passengers to wear helmets.[4]

[2] (a) Federal Motor Vehicle Safety Standard (FMVSS) 571.218 establishes minimum performance requirements for motorcycle helmets. The standard defines minimum levels of performance that helmets must meet to protect the head and brain in the event of a crash. The USDOT regularly conducts compliance testing of helmets sold in the United States to determine whether they meet the federal standard. (b) The helmet use of the surviving riders was determined based on postcrash interviews and scene photographs.

[3] (a) Three of the riders and passengers who died still had their helmets with them at the time of autopsy. (b) Based on the statement by one of the surviving riders and the nature of the injuries of the rider leading the formation, the lead rider most likely was not wearing a helmet. (c) Although the remaining three riders and passengers who died did not have helmets with them (next to them) at their locations of rest, there were several unclaimed helmets in the area of the crash.

[4] New Hampshire, Illinois, and Iowa are the only three states that do not have any motorcycle helmet laws. New Hampshire offers helmet guidance in its *State of New Hampshire Motorcycle Manual*.

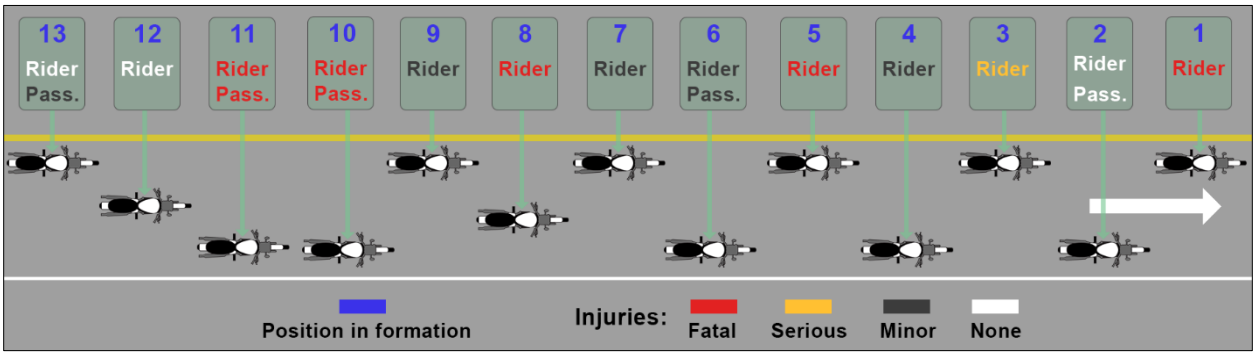

Figure 3. Formation of the motorcycles at the time of the initial impact with the truck, depicting their probable position (left or right) in the formation and the level of injury to riders and passengers. Diagram is not intended to represent precise lateral or longitudinal spacing between the motorcycles.[5]

1.2.2 Emergency Response

The Gorham Police Department (GPD) dispatcher was notified of the crash at 6:26 p.m. through a 911 call and immediately dispatched GPD patrol units, the first of which arrived on scene at 6:36 p.m.

The dispatcher notified Randolph Volunteer Fire Department (RVFD) and Gorham Fire Department (GFD) of the crash at 6:28 p.m. The RVFD dispatched one engine unit. The GFD sent one engine and two emergency medical service (EMS) units; the first unit arrived on scene at 6:44 p.m. The chief of the RVFD assumed the role of incident commander (IC) on arriving on scene at 6:38 p.m. While approaching the crash scene, the GFD chief requested additional EMS units and that a mutual-aid call be made to neighboring areas; the GFD chief assumed the IC role after arriving on scene at 6:50 p.m. As a result of the mutual-aid call, two other EMS units—from Berlin and Lancaster—and one engine unit from Jefferson were dispatched to the crash.

Two EMS units transported two injured motorcycle riders to a local hospital (riders in formation position 3 and 7). The last rider was transported at 7:16 p.m., arriving at the hospital 20 minutes later. Another rider was treated on scene while the remaining riders refused treatment. The extent of the injuries for the riders who refused treatment was established through interviews; all those riders either sustained minor injuries or were uninjured.

1.3 Location

The crash occurred in the eastbound lane of US-2 near mile marker 12.8. At this location, US-2 is a two-lane road—one eastbound and one westbound lane of travel. Each lane is about 12 feet wide and separated by a solid double yellow line; the center line does not have rumble strips. Both lanes of travel have an adjacent 4-foot-wide paved shoulder, delineated from the travel lanes by a solid white line.

The crash occurred at the western end of a 701-foot-long straight section of the roadway. The posted speed limit at this location is 50 mph. The horizontal alignment west of the crash

[5] See table in appendix C showing the formation positions of the riders and passengers, including their ages, gender, helmet use, and injury level.

location consists of a 2,625-foot-long radius curve—to the left in the westbound direction of travel (travel direction of the combination vehicle)—that is about 511 feet long (see figure 1 for the location of the horizontal alignment, as shown in aerial view). The first impact occurred approximately 4 feet before the start of this curve. The westbound approach to the crash site transitions into a crest vertical curve with a maximum ascending grade of 3.21 percent (see figure 4).[6] The vertical crest is located about 105 feet east of the first area of impact. West of the vertical crest, the highway plan depicts a descending grade of 4.37 percent. The total length of the vertical curve is 541 feet. According to guidelines from the American Association of State Highway and Transportation Officials, the recommended stopping distance for a 50-mph roadway is 425 feet (AASHTO 2018).

Figure 4. Westbound view of US-2, just west of the second area of impact.

The average daily traffic on US-2 in 2018, measured about 1.2 miles west of the crash location, was 6,474 vehicles, 80 percent of which were passenger vehicles. Examination of the 5-year crash history—from 2014 to 2019—within 12 miles of the crash location revealed two crashes involving more than one vehicle, the last of which occurred in 2015.[7]

1.4 Vehicle Factors

1.4.1 Combination Vehicle

1.4.1.1 General Description. The combination vehicle consisted of a 2016 Ram 2500 pickup truck and a 2015 Quality Trailers flatbed trailer (see figure 5 for an exemplar combination vehicle). The pickup truck was equipped with a 6.7-liter turbo diesel engine, an automatic

[6] A crest vertical curve is a curve that connects inclined sections of roadway, forming a crest that generally consist of an ascending (or positive) grade and a descending (or negative) grade.

[7] The crash in 2014 was a rear-end crash resulting from wild animals encroaching onto the roadway. The crash in 2015 was a result of a centerline crossover due to loss of control of the vehicle.

transmission, and a four-wheel-drive powertrain. At the time of manufacture, the pickup truck had a gross vehicle weight rating (GVWR) of 10,000 pounds; the GVWR of the trailer was 14,000 pounds. The GVWR of the combination vehicle was 24,000 pounds. The trailer was a gooseneck flatbed car hauler with attachable ramps to allow transported vehicles to be driven onto the trailer. A winch was mounted to the front of the trailer to enable loading of nonoperative vehicles. At the time of the crash, the trailer was empty.

Figure 5. Exemplar pickup truck and trailer from Westfield Transport.

1.4.1.2 Damage. The entire pickup truck sustained severe fire damage (see figure 6). Although the fire destroyed most of the frontal exterior painted surfaces and plastic components, body panel deformation due to direct impacts could be discerned. The front end of the vehicle sustained substantial damage, with the deepest penetration localized slightly to the left of center, about 16 inches deep. The front bumper was deformed and damaged across its length. The hood was deformed, showing signs of contact and induced damage. Both driver and passenger mirrors were displaced. The upper steering column was separated from the rest of the steering system, and the steering wheel had melted. The coil spring on the left side of the steer axle was dislodged rearward.

Figure 6. The pickup truck postcrash, with damage to the front end (left) and the right side (right).

The front passenger door had contact damage across the bottom that extended to the right rear wheel well. All the windows were missing. The pickup truck's interior also sustained comprehensive fire damage. The steel frame of the driver's seat remained in the wreckage. The front passenger seat and the rear seats were missing, as they had previously been removed to create a makeshift sleeping area (see section 1.7.3). The front axle of the trailer was deformed rearward in the center. The tires on this axle were misaligned inward. There was also minor fire damage to the pigtail connector.[8]

1.4.1.3 Mechanical Inspection. The impact and fire damage affected all major mechanical systems. NTSB investigators performed detailed inspections of braking, steering, suspension, and electrical systems, and examined wheels and tires. Due to fire damage, the functional check of the braking system could not be performed, but braking components were examined. All but one of the rotors and brake pads met regulatory specifications; the left rotor on the steer axle was 0.4 millimeters below the required minimum thickness.[9] The rotors and brake pads on the trailer also met regulatory specifications; however, the right brake drum on the trailer's rear axle was contaminated with oil and grease from a wheel bearing.[10] The contamination of the brake drum was a precrash condition.

The steering tie rod had been displaced during the collision and was missing. The connecting points for the tie rod appeared fractured, and the entire segment had separated. Without the tie rod, the left front wheel would have been uncontrollable.[11] The tire friction marks on the roadway at the location of the impact with the first motorcycle showed evidence of tire deflation.

[8] A *pig-tail connector* is an electrical cord that powers the lights on the trailer from the truck.

[9] (a) According to 49 CFR 393.47(g), the thickness of the rotors on a commercial vehicle shall not be less than the limits established by the rotor manufacturer. For the rotors on the pickup truck, the manufacturer specified a minimum thickness of 37.4 millimeters for rotors on a steering axle (axle 1), and 32.4 millimeters for rotors on a non-steering axle (axle 2). (b) According to 49 CFR 393.47(d), the minimum brake pad thickness for hydraulic disc brakes is 1.6 millimeters for brakes on all axles.

[10] According to 49 CFR 393.47(a), brake components must be maintained to provide for safe and reliable stopping of a commercial vehicle.

[11] The *tie rod* is a mechanical component that links the left and right steering knuckles to transfer input forces from the steering wheel to turn the front wheels. The tie rod connects the right wheel to the left, by transferring the input to the left wheel through tie rod end connected to the knuckle.

Although the tie rod separation may have occurred as a result of the impact with the first motorcycle, the separation was clearly established after the impact with the second motorcycle.

Because of fire damage, the functional checks of the electric systems could not be completed. All tires on the pickup truck and the trailer—those not destroyed by fire—had tread depths within the minimum requirements.[12] The left front tire separated from the wheel before the fire and was found near the pickup truck; the tire was unburnt, but its outward sidewall was damaged.

The pickup truck was equipped with airbags and an airbag control module, which under certain conditions can record event-related data such as vehicle speed. However, because of damage from the postcrash fire, there was no evidence to indicate whether the airbags were deployed, and no usable data were retrieved from the module.[13]

1.4.1.4 Roadside Inspection, Maintenance, and Safety Recalls. The pickup truck passed its most recent roadside inspection on May 10, 2018.[14] Westfield Transport produced limited records regarding repair of nonoperational vehicles but no driver vehicle inspection reports and periodic inspection records, as required under 49 CFR 396.3. As of June 25, 2019, there were 12 safety recalls for the crash-involved pickup truck.[15] The carrier's records show that all those repairs were made.

1.4.2 Motorcycles

The motorcycle riders described traveling in a staggered formation that created a left and a right column in the eastbound travel lane. Of the 13 motorcycles discussed in this report, nine were inspected by NTSB investigators. The remaining four motorcycles were driven away from the scene and were not available for postcrash inspection. Of the inspected motorcycles, six sustained major damage, including fractured and torn wheels, seats, or handlebars; two motorcycles sustained moderate damage, including contact damage or broken lights and turn signals; one motorcycle sustained minor damage, including minor scrapes and dents. The six motorcycles with major damage were directly struck by the pickup truck or its trailer—formation positions 1, 3, 5, 8, 10, and 11; the motorcycles in formation positions 10 and 11 also sustained fire damage (see table 2). The motorcycle in position 7 rear-ended the one in front (motorcycle in formation position 5).

Two motorcycles (formation positions 4 and 9) overturned onto the pavement without contacting another vehicle. The remaining four motorcycles (formation positions 2, 6, 12, and 13) were documented as stopping upright without evidence of impact or overturning. Four motorcycles (formation positions 2, 9, 12, and 13) were equipped with an antilock braking system (ABS).[16]

[12] According to 49 CFR 393.75(b), the minimum tread depth for steer axle tires is 4/32 inch and 2/32 inch for the tires on other axles.

[13] The airbags may have deployed, but the postcrash fire destroyed any such evidence.

[14] A New York State Department of Transportation Commercial Vehicle inspector performed a Commercial Vehicle Safety Alliance Level 2 inspection.

[15] The safety recall information was obtained from the NHTSA safety recall database website.

[16] (a) The performance of motorcycle ABS is defined by FMVSS 122. Although FMVSS 122 does not require ABS on motorcycles, the standard specifies the performance of a motorcycle equipped with ABS.

Table 2. Motorcycle damage description and position in the formation.

Model	Damage [a]	Occupant Injuries	Formation Position
1998 Harley Davidson Electric Glide	- Major damage - Contact with left front area of pickup truck	Rider: Fatal	1
2019 Harley Davidson Road Glide Special [b]	- No documented damage [c] - Remained upright	Rider: None Pass.: None	2
2006 Harley Davidson Heritage Softail	- Major damage - Contact with left front area of pickup truck	Rider: Serious	3
2007 Harley Davidson CVO Road King 3	- Moderate damage - Overturned / loss of stability	Rider: Minor	4
2012 Harley Davidson – CVO Ultra Classic Electra Glide	- Major damage - Contact with right side of pickup truck & rear contact by motorcycle 7	Rider: Fatal	5
2006 Harley Davidson Road Glide	- No documented damage [c] - Remained upright	Rider: Minor Pass.: Minor [d]	6
2012 Harley Davidson Electra Glide Ultra Unlimited	- Moderate damage - Contact with rear of motorcycle 5	Rider: Minor	7
2005 Harley Davidson Electra Glide Ultra Classic	- Major damage - Overturned followed by contact with trailer	Rider: Fatal	8
2015 Harley Davidson – Softail Deluxe [b]	- Minor damage - Overturned at very low speed	Rider: Minor	9
2012 Harley Davidson Electra Glide Ultra Limited	- Major damage with fire - Contact with front of pickup truck	Rider: Fatal Pass.: Fatal	10
2007 Harley Davidson Electra Glide Ultra Classic	- Major damage with fire - Contact with front of pickup truck	Rider: Fatal Pass.: Fatal	11
2019 Harley Davidson Street Glide [b e]	- No documented damage [c] - Remained upright	Rider: No injury	12
2015 Harley Davidson – Electra Glide Ultra Limited Shrine [b]	- No documented damage [c] - Remained upright	Rider: None Pass.: Minor	13

[a] For a comprehensive description of damage, see vehicle factual report in the docket for this investigation.

[b] Four motorcycles (in formation positions 2, 9, 12, and 13) were equipped with ABS.

[c] Motorcycles that were driven from the scene were not examined by investigators and presumably sustained no or minimal damage.

[d] The rider and the passenger of this motorcycle sustained minor injuries from flying debris.

[e] Investigators were unable to determine the left/right column of the motorcycle in position 12.

(b) Of the 9 motorcycles that NTSB investigators inspected, one was equipped with ABS (position 9). The Harley Davidson website was used to confirm the presence of ABS on 3 of the motorcycles (positions 2, 12, and 13) that were not inspected, using each motorcycle's vehicle identification number (VIN).

1.5 Crash Sequence

The crash scene was documented by NHSP investigators, who gave the NTSB aerial and ground photographs along with station mapping data. The roadway evidence, which stretched for about 250 feet, consisted of numerous overlapping tire friction marks, roadway surface scars and gouges, fluid trails, and vehicle component debris. NTSB investigators examined the vehicle damage and roadway documentation to ascertain the crash sequence, including the locations of impact.

The sequence of critical movements of the combination vehicle and the order of impacts, as they occurred in time, between the pickup truck (or its trailer) and the motorcycles were as follows:

- About 166 feet east of the pickup truck's final rest position—as measured from the truck's midpoint—investigators identified the beginning of a series of parallel tire friction marks consistent with the wheel track of the pickup truck, just before it crossed the centerline.
- **First impact area:** About 16 feet west of the start of the tire marks, evidence showed an onset of a separate tire friction mark on the roadway centerline. The mark was consistent with an impact that led to deflation of the pickup truck's front left tire and eventual instability of the combination vehicle. At this location, the tire marks exhibited a leftward angle of about 2.5 degrees toward the eastbound lane. This mark established the area of impact between the pickup truck and the motorcycle leading the group (formation position 1 in figure 7). The approximate location of the lead motorcycle relative to the truck is also shown in figure 7. The roadway and vehicle damage evidence indicated that the motorcycle was struck along its left side by the pickup truck's left front end.
- **Second impact area:** About 22 feet west of the first impact and 2 feet into the eastbound lane, the onset of a trail of fluid was identified, consistent with a sudden discharge of fluid from a vehicle. At this location, the parallel tire marks on the right side of the pickup truck showed a significant increase in visual intensity and evidence of right-angle striations, indicating lateral wheel slip consistent with the force of an impact. This location was identified as the area of impact between the pickup truck and the second struck motorcycle (formation position 3 in figure 7). The roadway and vehicle damage evidence indicated that the motorcycle was struck along its left side by the pickup truck's left front end. After the second impact, tire friction marks indicated that the leftward heading of the pickup truck increased to about 17 degrees.
- **Third impact area:** About 81 feet west of the first area of impact, tire friction marks, fluid and vehicle debris, and roadway gouging were observed. This area was identified as the location of impact between the pickup truck and a motorcycle in formation position 5, as depicted in figure 7. The vehicle damage evidence indicates that this motorcycle was hit by the right side of the pickup truck. Additionally, the roadway and vehicle damage evidence indicated that the motorcycle in formation position 7 collided with the rear of the motorcycle ahead of it (motorcycle in formation position 5); motorcycle 7 was not struck by the pickup truck or the trailer.

- **Fourth impact area:** About 53 feet west of the first area of impact, roadway gouging and fluid debris were identified about 2.6 feet into the eastbound lane. The gouging, scrapes, and fluid were consistent with an area of impact. This area was identified as the location of impact between the trailer and the motorcycle in formation position 8, as depicted in figure 7. The roadway and vehicle damage evidence indicated that the motorcycle underrode the trailer and was subsequently dragged by the trailer to final rest.[17]
- **Fifth impact area:** As the pickup truck continued across the eastbound lane toward the shoulder, its heading increased to about 21 degrees, and the left front tire mark exhibited characteristics consistent with sliding. About 95 feet west of the first area of impact, pavement scrapes and gouging, along with vehicle debris, were observed in the eastbound lane just before the edge line. This area was identified as the location of impact between the pickup truck and two of the motorcycles (formation positions 10 and 11 in figure 7). The roadway and vehicle damage evidence indicated that both motorcycles were struck at their front and left side by the pickup truck's front right end. Both motorcycles remained engaged with the pickup truck as it traveled to final rest.

As the pickup truck left the pavement, it struck an earthen embankment 6 feet from the pavement; its wheels furrowed into the soil, causing it to rotate counterclockwise before it stopped. At this point a fire broke out, which caused substantial fire damage to the pickup truck and to two of the motorcycles that traveled to rest with the truck. The fire ignited as a result of the motorcycles' gas tanks rupturing.

Two motorcycles (formation positions 4 and 9) overturned onto the pavement without contacting the combination vehicle or another motorcycle. The motorcycle in position 9 overturned at a very low speed—at the position where it came to rest—as the road showed no sign of skidding or sliding. Signs of skidding and motorcycle damage indicated that the motorcycle in position 4 overturned at a higher speed. The remaining four motorcycles were documented as stopping upright without incurring any damage.

The distance between the combination vehicle's first collision (with the motorcycle leading the formation) and the last collision (with motorcycle 11 in the formation) was 95 feet. Roadway and vehicle evidence was insufficient to determine the precise spacing between each of the 11 motorcycles.

A witness who was traveling west behind the combination vehicle for several minutes, including less than 1 minute before the crash, estimated the vehicle's speed as 55–60 mph moments before the collision. However, the roadway evidence was insufficient to corroborate this estimate; for example, there was no sign of hard braking or rightward steering by the combination vehicle before the first impact. The tire marks following the first impact exhibited characteristics more consistent with the left front wheel being redirected as a result of the broken tie rod, but braking cannot be excluded.

[17] Based on the lack of scrapes in the specific area of the trailer, the motorcycle had already overturned before underriding the trailer.

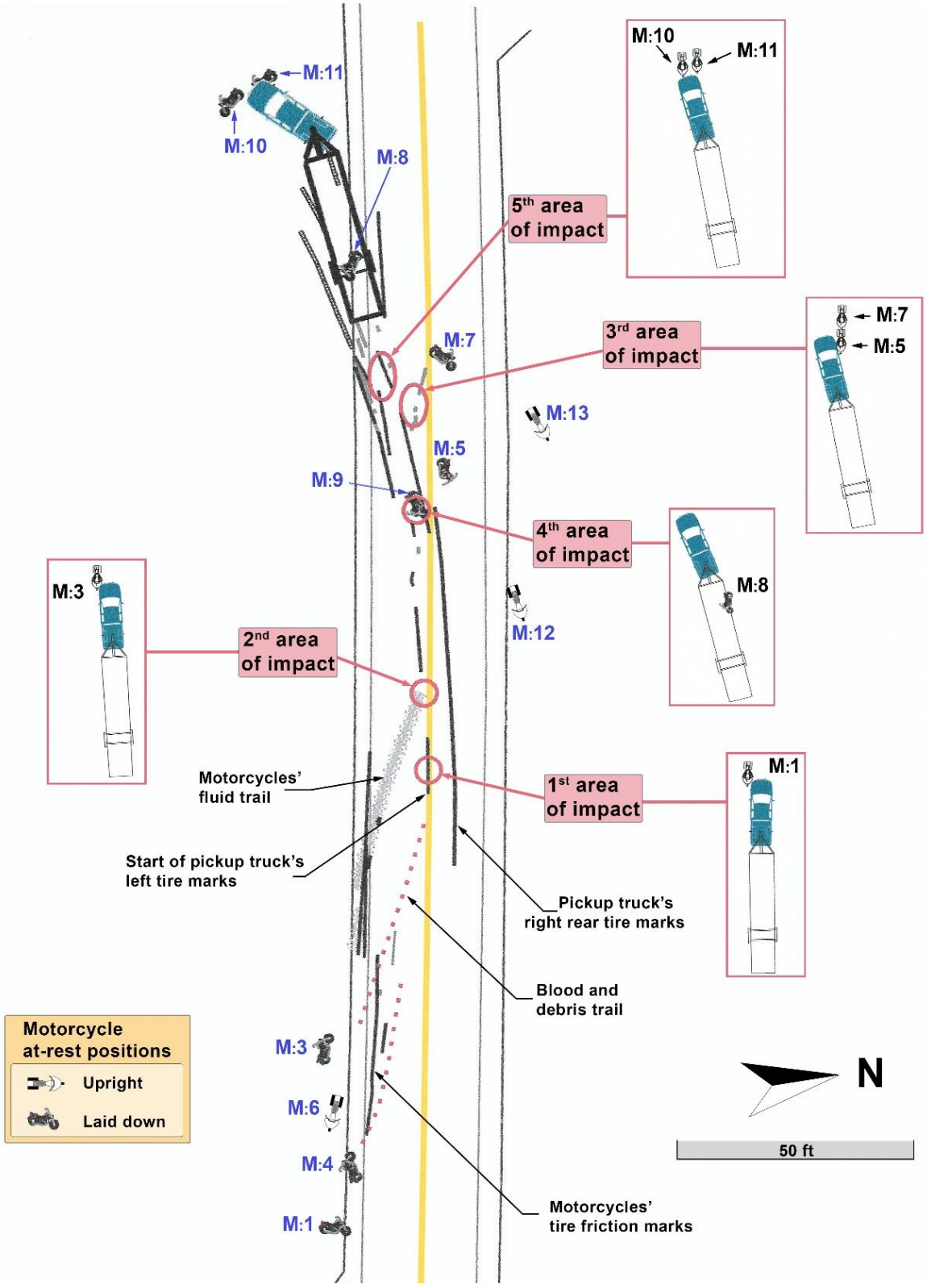

Figure 7. Postcrash scene diagram depicting the rest locations of the combination vehicle and 12 of the motorcycles, and areas of impact and the angle of collision between the combination vehicle and six of the motorcycles (the occupants of which accounted for all the fatalities and the one serious injury). The motorcycles in positions 2, 6, 12, and 13 came to rest upright (the motorcycle in position 2 came to rest east of the area depicted in the diagram).

1.6 Human Factors

1.6.1 Pickup Truck Driver

1.6.1.1 Licensing, Employment History, and Driving Record. The 23-year-old driver started working for Westfield Transport as a driver on June 19, 2019, 2 days before the crash. At the time of the crash, he held a Massachusetts class A commercial driver's license (CDL) with no endorsements and a restriction prohibiting operating a commercial vehicle with a manual transmission.[18] He obtained his CDL in August 2018; the license had an expiration date of December 2021.

On obtaining a CDL, the driver was hired by Universe Express as a commercial driver, where he worked until his employment was terminated in December 2018 due to unusual behavior that his employer believed resulted from drug use.[19] In December 2018, the driver was hired by FBI Express.[20] During his employment at FBI Express, the driver was involved in a crash in Baytown, Texas, on June 3, 2019.[21] Postcrash, the carrier asked him to submit a urine sample for drug testing.[22] The driver submitted a sample on June 7, after the 32-hour window during which testing is required to be performed; the test was negative.[23] As a result of the driver's involvement in the crash and failing to submit to drug testing in time, FBI Express terminated his employment on June 7.

Based on the limited carrier documentation and interviews with Westfield Transport management, the only vehicle operated by the pickup truck driver during his employment at Westfield Transport was the one involved in this crash. The vehicle had a GVWR below 26,001 pounds, not requiring a CDL to operate.[24]

Records from the Massachusetts Registry of Motor Vehicles (RMV) show that the driver had a significant history of unsafe driving behavior, including traffic violations, some of which had led to license suspensions. The driver declined requests for an interview by NTSB investigators. During interviews with his previous employers, NTSB investigators learned about the driver's other traffic violations as well as the reasons his employment was terminated by both

[18] According to 49 CFR 383.5, a class A CDL allows drivers to operate vehicles with combined GVWR greater than 26,001 pounds.

[19] When interviewed by NTSB investigators, the Universe Express manager described the driver at that time as "acting different" and being "shaky."

[20] Like Westfield Transport, both Universe Express and FBI Express are passenger-vehicle hauling motor carriers.

[21] The driver was operating a truck-tractor combination vehicle when he ran off the road and overturned the vehicle. He told the responding officers that he swerved to avoid striking another vehicle that cut him off and lost control. He was not cited.

[22] Based on 49 CFR Part 382.303, because this crash was nonfatal and the driver was not cited, federal regulations did not require the driver to submit to a postaccident drug test. However, carriers may require crash-involved drivers to submit to a postcrash drug test regardless of culpability; this is a standard industry practice.

[23] The carrier made several attempts to reach the driver immediately after the crash, but he did not respond until June 7. According to 49 CFR Part 382.303, if the postcrash drug test (whether mandated by federal regulations or by the carrier) is not administered within 32 hours of the crash, the employer is to cease attempts to have the testing performed and document why the test was not administered within the 32-hour window.

[24] According to 49 CFR 383.5, vehicles with a GVWR below 26,001 pounds do not require a CDL to operate, except for vehicles carrying passengers or hazardous materials.

Universe Express and FBI Express. The driver's violations, license suspensions, and employment actions are summarized in table 3.

Table 3. Summary of pickup truck driver's driving and employment record, April 2012–June 2019.

Date of Event	Violation Type or Behavior	Result	Record Source
06/24/2014	- Driving with a suspended license, in Macedonia, Ohio - Speeding	Driver's license suspended until May 2, 2017 [a]	Massachusetts RMV
August 2018 – Obtained CDL			
December 2018	Unusual behavior resulting from suspected drug use noted by Universe Express manager	Terminated from Universe Express	Employer
02/18/2019	Improper lane/location	*No violation or suspension*	Massachusetts RMV
05/11/2019 [b]	- Failed field sobriety test - Refused urine drug test	Nonresident driving privilege suspended in Connecticut	Connecticut Department of Motor Vehicles (DMV) and police report
06/03/2019 [c]	- Ran off road and overturned in Baytown, Texas - Was not cited or charged - FBI Express requested driver submit to drug test	*No violation or suspension*	- Police report - Employer
06/07/2019	Driver provided urine sample for drug testing (test was negative)	Terminated from FBI Express for not completing drug test in time and for being involved in a crash	Employer

[a] Although Ohio entered the information about the infractions into the National Driver Register (NDR) immediately after the violations, the RMV did not become aware of the infractions until December 2016, at which point the RMV suspended his license.

[b] The events of this day and the outcomes are further discussed in section 1.8.

[c] Violation occurred while operating a commercial vehicle.

1.6.1.2 Medical Certification and General Health. The pickup truck driver obtained his CDL medical certificate in August 2018; it was valid for 2 years. On the medical certification application, he reported that he did not have any illness or injury and that he had not taken any medications in the past 5 years. He also stated that he had not used an illegal substance in the last 2 years and had never failed a drug test or been dependent on an illegal substance.

1.6.1.3 History of Illicit Drug Use. As a result of interviews with the pickup truck driver's previous employers, family members, and other sources, NTSB investigators discovered that the driver had a history of drug abuse. The history included (1) attending a 3-month-long residential drug rehabilitation program in 2017, (2) being terminated for suspected drug use by Universe Express in December 2018 and by FBI Express in June 2019, (3) being arrested for drug possession in February 2019 in Baytown, Texas, and (4) being arrested for operating a vehicle under the influence in May 2019.

At his previous employer FBI Express, the driver underwent a preemployment USDOT drug test and was also selected for random drug testing; the results of both tests were negative. He did not undergo preemployment drug testing at Westfield Transport (see section 1.7.2 for a description of the carrier's drug-testing program).[25]

Although the driver refused interview requests by NTSB investigators, immediately postcrash and in the following several days, he made numerous statements to law enforcement officers regarding his drug use:[26]

- Used 3–10 bags of heroin a day.[27]
- Drank energy drinks and ate chocolate to help with the effects of drugs.
- Used illicit drugs the night before the crash, about 9–10 p.m.
- Used two bags of heroin and 0.5 grams of cocaine on the morning of the crash, about 8 a.m.
- Could feel the effects of cocaine after leaving his last delivery (17 minutes before the collision).
- Was not "crashing" from drug use at the time of the collision but would have started to "crash" soon.[28]

1.6.1.4 Postcrash Toxicology. At the request of the NHSP, the driver voluntarily submitted to having a blood sample taken for drug testing. Two blood specimens were collected—at 8:37 p.m. and at 9:33 p.m.—about 2–3 hours after the crash, and were analyzed by the New Hampshire Department of Public Safety Forensic Laboratory. The test identified:

- 1,058 nanograms per milliliter (ng/mL) of benzoylecgonine.
- 6.7 ng/mL of fentanyl.
- 0.33 ng/mL of acetyl fentanyl.
- 3.3 milligrams per mL of norfentanyl.
- 17 ng/mL of morphine.
- <1 ng/mL of 6-monoacetylmorphine (6-MAM).

[25] As discussed in section 1.7.2, because the driver operated a non-CDL-required vehicle during his employment at Westfield Transport, he was not subject to preemployment drug testing, as stipulated by 49 CFR 382.301.

[26] See human performance factual report in the public docket (HWY19MH010) for this investigation and the associated attachments for additional information on the driver's drug use.

[27] In separate statements to law enforcement, the driver gave different accounts of his daily drug use habits.

[28] "Crashing" or comedown is a phase of drug withdrawal that involves deterioration in mood and energy when a psychoactive drug, typically a stimulant, clears from the blood.

Benzoylecgonine is an inactive primary metabolite of cocaine.

Fentanyl is a Schedule II synthetic opioid approved by the Food and Drug Administration as an analgesic and anesthetic.[29] It is about 100 times more potent than morphine and 50 times more potent than heroin as an analgesic. Like other opioid analgesics, its effects include euphoria, sedation, confusion, drowsiness, nausea, and respiratory depression.[30] Acetyl fentanyl is a Schedule I opioid analgesic; it is similar in its effects to fentanyl and is about 16 times more potent than morphine.[31] Norfentanyl is the primary inactive metabolite of fentanyl.

Morphine is a Schedule II nonsynthetic narcotic derived from opium and is used to treat chronic and acute pain.[32] Its effects include analgesia, drowsiness, nervousness, nausea, and respiratory depression.[33] Additionally, morphine is a metabolite of both codeine and heroin. Heroin is a Schedule I opioid extracted from certain varieties of poppy plants. Its effects include euphoria followed by a twilight state of sleep and wakefulness, respiratory depression, nausea, and heavy extremities.[34] 6-MAM is an active, unique metabolite of heroin. Its effects are similar to heroin but somewhat more potent.

1.6.1.5 Activities Before the Crash. NTSB investigators used information from police interviews, cell phone records, cell phone data, Westfield Transport records, highway toll data, bills of lading, and witness interviews to reconstruct the driver's activities before the crash. He did not work on June 18, and the records show that he had a 4-hour opportunity for sleep (maximum of 2.5 consecutive hours) on the night of June 18–19.

Based on the driver's known activity, he most likely used the makeshift, noncompliant sleeper berth in the pickup truck on the night of June 19–20.[35] On the morning of June 20, after about an 8-hour opportunity for sleep, the driver made his first delivery at 8:36 a.m. in Bangor, Maine. He completed his last delivery around 6 p.m. in Brooklyn, Connecticut, and arrived home in West Springfield, Massachusetts, later in the evening.

On the day of the crash, after about a 7.5-hour opportunity for sleep, the driver departed his home shortly after 7 a.m. and drove to Mechanicville, New York, to pick up vehicles for

[29] The Controlled Substances Act of 1970 established five classifications or "schedules" for controlled substances. Schedule II substances have a high potential for abuse and a currently accepted medical use in the United States.

[30] Drug Enforcement Administration (DEA). "Drugs of Abuse: A DEA Resource Guide." Drug Enforcement Administration, US Department of Justice, 2017, pp. 40–41.

[31] (a) Drug and Chemical Information about Acetyl Fentanyl, available from the DEA at https://www.deadiversion.usdoj.gov/drug_chem_info/acetylfentanyl.pdf, accessed September 16, 2020. (b) Schedule I substances have a high potential for abuse, no currently accepted medical use in treatment in the United States, and a lack of accepted safety use under medical supervision.

[32] DEA. "Drugs of Abuse: A DEA Resource Guide." Drug Enforcement Administration, US Department of Justice, 2017, p. 45.

[33] See https://medlineplus.gov/druginfo/meds/a682133.html, accessed September 16, 2020.

[34] Drug Enforcement Administration. "Drugs of Abuse: A DEA Resource Guide." Drug Enforcement Administration, US Department of Justice, 2017, p. 42.

[35] Because the driver was not using an electronic logging device (ELD) at that time, NTSB investigators were unable to determine the exact location where the driver spent the night. Data from toll records and bills of lading showed that at 9 p.m. he was in Thomason, Maine. See section 1.7.3 for additional details on the sleeping berth and ELD.

transportation. After loading the vehicles, he drove to a dealership in Gorham, New Hampshire, where he arrived about 6 p.m. Approximately 17 minutes after departing the dealership, the driver crashed into the motorcyclists. Although he was using his cell phone at various times that day, the phone records indicate that he was not using it at the time of the crash.[36] Figure 8 shows the driver's activities in the 3 days before the collision and on the crash day.

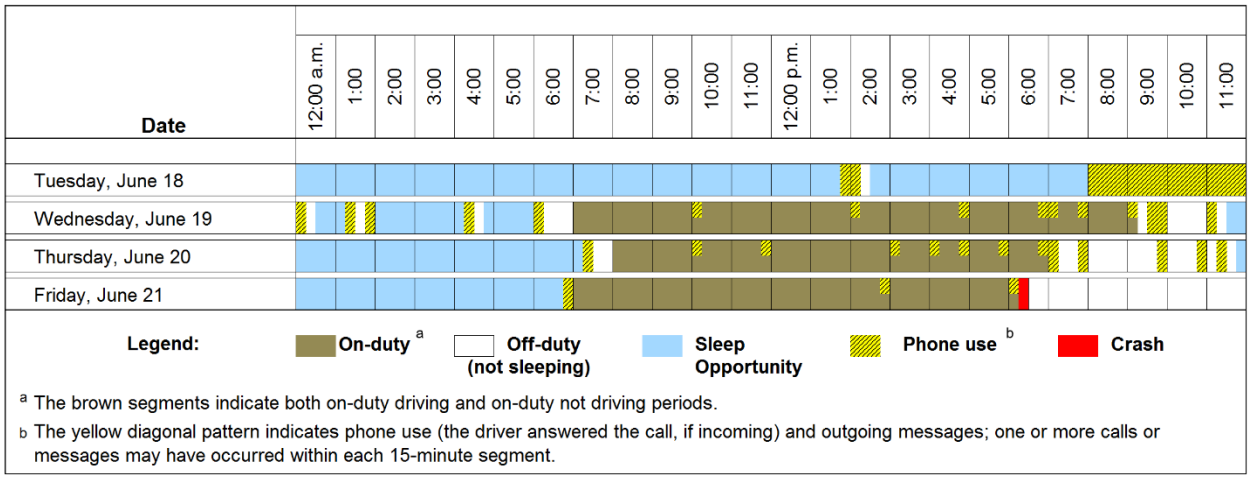

Figure 8. Precrash activities of the pickup truck driver, June 18–21, 2019.

In his postcrash interview with police, the driver stated that at the time of the collision he was leaning over to reach for a drink, causing him to cross over the centerline. GPD and NTSB investigators interviewed numerous witnesses who reported seeing the crash-involved combination vehicle moving erratically. These reports span the period of several hours prior to the crash to less than a minute before the crossover event and crash. The reports came from (1) members of the Littleton Fire Department, who stated that the combination vehicle traveled into the breakdown lane and nearly struck their fire truck, (2) employees of the Gorham dealership, who stated that the driver was operating erratically and nearly struck one of their employees, and (3) a witness who was following the combination vehicle for several minutes before the crash, including less than 1 minute before, who stated that the vehicle was weaving from the lane onto the shoulder and into the opposite lane of travel. The witness could not precisely recall the last occurrence of the vehicle's erratic movement. Ten other witnesses reported seeing earlier that day a vehicle matching the description of the crash-involved combination vehicle moving erratically, including, according to some statements, into the opposite travel lane.

1.6.2 Motorcycle Riders

The motorcyclists involved in the crash were members of the Jarhead Motorcycle Club of New England.[37] All the riders whom NTSB investigators interviewed reported having many years of riding experience. They were in Randolph to attend their annual meeting at the Mount Jefferson View Inn; the meeting was scheduled for the day after the crash. At the time of the collision, the

[36] Although records show that the driver used his cell phone earlier in the day, due to lack of other evidence (such as data from the vehicle's engine control module or electronic logs) investigators could not determine whether the driver's use of his cell phone earlier in the day occurred while driving.

[37] The club is a nonprofit charity organization based in Plymouth, Massachusetts. Its members are Marine veterans or former Navy corpsmen.

group of 15 motorcycles had departed the inn to travel to the American Legion in Gorham for a charity event. The group had just entered US-2 and the riders in the front of the staggered formation were about 1,100 feet from the inn at the time of the crash.

Postcrash, some of the motorcycle riders were toxicologically tested as part of the postmortem forensic examination or in the course of clinical examination and treatment, including the five riders who died and a surviving rider who was transported to a local hospital. The per se illegal blood alcohol concentration (BAC) in New Hampshire is 0.08 grams/deciliter (g/dL). One of the riders who died—position 1 in the formation—had a BAC of 0.135 g/dL. The four remaining riders who died had BACs of 0.071 (rider in formation position 5), 0.063 (rider in formation position 8), 0.07 (rider in formation position 10), and 0 (rider in formation position 11). One of the surviving riders (in formation position 3) who was transported to a hospital had a BAC of less than 0.01 g/dL.

1.7 Motor Carrier Operations

1.7.1 Overview

Westfield Transport, domiciled in West Springfield, Massachusetts, was a for-hire interstate motor carrier that obtained authorization from the USDOT in July 2016 to transport motor vehicles and general freight. The carrier operated in the northeast United States and used a broker to obtain loads (vehicles) for transport.

Westfield Transport provided NTSB investigators with a list of the drivers it employed and the vehicles it owned. Investigators obtained additional documentation from the carrier's insurance company showing that the carrier had insured one additional vehicle and six additional drivers compared with Westfield Transport's list.

NTSB investigators determined that at the time of the crash, the carrier owned eight vehicles and employed 12 drivers. All vehicles were pickup trucks in combination with gooseneck automobile transport trailers. In accordance with 49 CFR 390.5, these vehicles met the definition of a commercial motor vehicle.[38] Two of the eight vehicles exceeded a GVWR of 26,001 pounds; drivers operating those two vehicles were required to have a CDL.[39] Westfield Transport employees operating the six vehicles below 26,001 pounds were not required to have a CDL.

From studying Westfield Transport's roadside inspection records, NTSB investigators determined that after the carrier obtained operating authorization, it used at least three other vehicles compared with the list of vehicles it owned at the time of the crash. The investigators were unable to determine how often those other vehicles were used.

1.7.2 Hiring Practices and Record-Keeping

To be considered for hiring, federal regulations—49 CFR Part 391—mandate that drivers (1) be at least 21 years old, (2) hold a valid driver's license, (3) have no drug offenses on their

[38] Any vehicle above 10,001 pounds GVWR that operates in interstate commerce (or is designed to transport eight or more passengers or to transport hazardous material) is considered to be a commercial vehicle.

[39] See 49 CFR 383.5 for all the vehicle and cargo types as well as weight limits that require a CDL to operate, and 49 CFR 390.5 on how a motor vehicle is defined.

driving record, (4) pass the carrier's road test, and (5) be approved by the insurance company.[40] However, as described below, the carrier's records showed numerous failures to adhere to those regulatory requirements. Some of these requirements apply to the carrier, while others pertain to commercial drivers with further distinction for CDL and non-CDL holders.

According to 49 CFR 391.51, motor carriers are required to maintain driver qualification (DQ) files for all drivers of commercial vehicles (CDL and non-CDL holders), which among other documentation must include motor vehicle administration records.[41] Additionally, carriers are required to conduct a background check on prospective drivers, whether CDL-holders or not.[42] NTSB investigators examined Westfield Transport's records and found that the DQ file of the crash-involved driver was missing several required documents, including (1) his application for employment, (2) investigation and inquiries, and (3) driver accident history file.

Examination of other Westfield Transport drivers' DQ files showed similar noncompliance with federal requirements. Most critically, one active driver did not have a valid driver's license (CDL or non-CDL). A report from the commercial driver's license information system (CDLIS) for this driver indicated that his license was revoked on December 13, 2018; despite that fact, Westfield Transport hired him on February 26, 2019.[43] His DQ file included a motor vehicle report showing that his license was revoked until October 2022.

Because Westfield Transport had two vehicles that required a CDL for operation (vehicles that exceeded a GVWR of 26,001 pounds), the carrier was mandated pursuant to 49 CFR 382.301 to have a drug-testing program, including preemployment and random testing, as well as training in reasonable suspicion testing for supervisors.[44] Only those drivers who operated the two vehicles requiring a CDL were subject to federal drug-testing requirements. However, Westfield Transport did not have a drug-testing program and had failed to conduct preemployment drug testing for drivers who operated the two vehicles that required a CDL. Because the crash-involved driver,

[40] The insurance company told NTSB investigators that it had no approval process for adding drivers to the policy.

[41] Among other documentation, DQ files are required to include (1) the driver's employment application, (2) a copy of their driver's license or CDL, (3) motor vehicle records obtained within 30 days of hire and annually after hiring, (4) investigation into the driver's background and safety record, including accidents that do not result in towing of vehicles, and (5) a copy of the driver's medical certification.

[42] Under 49 CFR 391.23, a motor carrier is required to investigate a prospective driver's safety performance history.

[43] CDLIS is a nationwide database that enables state driver licensing agencies to ensure that each commercial driver has only one driver's license and one complete driver record. State driver licensing agencies use CDLIS to (a) transmit out-of-state convictions and withdrawals, (b) transfer the driver record when a CDL holder moves to another state, and (c) respond to requests for driver status and history. CDLIS was established under the Commercial Motor Vehicle Safety Act of 1986 and is based on 49 CFR 383–384. The system is maintained by the American Association of Motor Vehicle Administrators (AAMVA).

[44] According to 49 CFR 382.603, motor carriers are required to provide reasonable suspicion training to at least some of its managers or other staff. Such training allows staff to recognize and appropriately handle employees who exhibit signs of substance abuse (alcohol or other drugs).

during his employment at Westfield Transport, was operating a vehicle that did not require a CDL, he was not subject to federal drug-testing requirements.[45]

Westfield Transport also did not follow basic industry best practices. As a result, the carrier did not have a safety plan, written safety policies, or an operating procedures manual. The carrier also did not provide any annual, remedial, or specialized training to its drivers; training for newly hired drivers was also absent. Although it was not documented, the carrier stated that it gave drivers a bonus if they passed roadside inspections without any violations.

1.7.3 Hours of Service and Sleeping Berth

Westfield Transport used ELDs from KeepTruckin for recording and monitoring drivers' compliance with hours-of-service (HOS) regulations.[46] However, the combination vehicle that the crash-involved driver was operating during his employment had a non-functional ELD.[47] The driver told NHSP postcrash that he was therefore using a paper logbook; the logbook was destroyed in the postcrash fire. When examining data from the driver's cell phone, NTSB investigators obtained a photograph of a logbook page from June 19 that indicated he was parked in New Hampshire and in the sleeper berth from 5 p.m. until midnight on June 19. However, data from toll records and bills of lading showed that he continued driving and was in Thomason, Maine, at 9 p.m. Because the driver reported off-duty status for the hours that he was driving, federal regulations consider the logbook falsified for that day.[48]

NTSB investigators examined electronic log data for other Westfield Transport drivers and compared the information to supporting documentation, such as highway toll reports and fuel receipts, to verify HOS compliance. They determined that of the 150 randomly selected electronic logs examined, 28 were falsified. After his initial interview with NTSB investigators, the carrier manager notified the NTSB that he had lied about some of the logs, including the logs by the Westfield Transport owner.[49] During a subsequent interview, the manager showed how he, the owner, and the drivers were able to tamper with the KeepTruckin device, preventing it from accurately recording HOS.[50] The manager demonstrated to NTSB investigators how to disable the

[45] (a) Because the truck driver operated a vehicle that did not exceed the GVWR of 26,001 pounds, he was not subject to federal drug-testing requirements, despite having a CDL. (b) GVWR includes the weight of a vehicle (power unit and a trailer), as well as its potential load.

[46] Title 49 CFR 395.3 sets on-duty limits for commercial drivers of freight-carrying vehicles.

[47] Although exemptions exist regarding mandatory use of ELDs—see 49 CFR 395.8—neither the pickup truck driver nor the vehicle met the exemption requirements. If an ELD malfunctions, a driver should use a paper logbook to complete a trip.

[48] Although the total number of reported driving hours that day was beyond the maximum HOS, because the driver incorrectly reported his duty status, federal regulations at 49 CFR 395.8(e)(1) consider the logs falsified for that day.

[49] The manager stated that he had lied about the logs for the cargo load that the crash-involved driver transported on his first day of employment. The cargo load was originally picked up by the owner of Westfield Transport on June 18, 2018, at 7:30 a.m. in Grand Rapids, Michigan. For the next 19.5 hours, the owner drove the load to West Springfield, Massachusetts, arriving at 3:00 a.m. on June 19. The electronic logs showed that he stopped driving at 9 p.m., about 13 miles east of Dunkirk, New York.

[50] According to 49 CFR 395.8(e)(2), "No driver or motor carrier may disable, deactivate, disengage, jam, or otherwise block or degrade a signal transmission or reception, or reengineer, reprogram, or otherwise tamper with an automatic on-board recording device or ELD so that the device does not accurately record and retain required data."

device's transmitter box to prevent it from accessing the global positioning system (GPS), and also how to alter the log records on the KeepTruckin smart phone application so that the ELD would not record a diagnostic event or a malfunction code when it reacquired GPS at a new location.

The Federal Motor Carrier Safety Administration (FMCSA) has specific requirements that apply to ELD manufacturers. One of the requirements, as provisioned under 49 CFR 395 subpart B, is that the device must be capable of monitoring its compliance with data-recording requirements "for detectable malfunctions and data inconsistencies."[51] One data inconsistency metric includes positioning compliance, which sets the requirements for recording a vehicle's GPS location. Manufacturers that meet these requirements—through a self-certification process—are added to the FMCSA list of certified ELD providers.[52] KeepTruckin ELD is on the list.

The entire Westfield Transport fleet of pickup trucks, including the crash-involved vehicle, had been modified to include a sleeping space. As part of the modification, the carrier removed the rear seat—and the front passenger seat in some vehicles—and added a mattress to create a makeshift sleeping area (see figure 9). The modifications did not comply with federal requirements for an approved sleeper berth.[53]

Figure 9. Exemplar vehicles from Westfield Transport with noncompliant sleeper berth, showing bedding placed across the rear seats (left image), and across the front passenger and rear passenger-side seats (right image).

1.7.4 Federal Oversight

1.7.4.1 Precrash: During the New Entrant Period. The FMCSA's new entrant safety assurance program, found at 49 CFR part 385, subpart D, is an 18-month safety-monitoring period for all new motor carriers, during which the new motor carrier must pass a safety audit to receive permanent USDOT registration. The program is intended to improve the FMCSA's ability to "identify at-risk new entrant motor carriers and ensure deficiencies are corrected before granting

[51] Appendix A of 49 CFR 395 subpart B includes detailed ELD recording requirements as well as codes for diagnostic and malfunction events.

[52] See the FMCSA website for additional information; accessed October 16, 2020.

[53] See 49 CFR 393.76 for additional information on sleeper berth specifications, including those pertaining to mattress size and occupant restraints.

them permanent registration." Westfield Transport entered the FMCSA new entrant safety assurance program on July 8, 2016, and passed an audit on October 21, 2016, without any violations.[54] At that time, the carrier was a single-vehicle operation. During the new entrant probation period of 18 months—July 2016 to January 2018—Westfield Transport had seven roadside inspections, which resulted in two out-of-service (OOS) violations for the driver.[55] Both violations occurred during a single roadside inspection on November 21, 2017. According to the FMCSA Motor Carrier Management Information System (MCMIS), these violations resulted in the carrier having one behavior analysis and safety improvement categories (BASIC) in alert status—related to HOS compliance—on December 29, 2017. The FMCSA uses data from roadside inspections—including all safety-based violations and state-reported crashes—to quantify a carrier's performance in seven BASICs.[56] Westfield Transport had no other violations, and on January 9, 2018, the carrier successfully exited the new entrant safety assurance program.[57] At that time, Westfield Transport had two pickup trucks and two trailers.

1.7.4.2 Precrash: After the New Entrant Period. Within a 1.5-year period after Westfield Transport exited the new entrant program—between January 2018 and the day of the crash—the carrier had 48 roadside inspections, which resulted in 23 OOS violations (20.8 percent of Westfield Transport's drivers and 16.6 percent of its vehicles were placed OOS).[58] The national average driver and vehicle OOS rates for freight-carrying motor carriers for 2019 were 5.5 percent and 21.7 percent, respectively.[59]

According to MCMIS, the carrier had three BASICs in alert status at the time of the crash—unsafe driving, HOS compliance, and driver fitness.[60] These three categories had been in alert status since February 2019.[61] The carrier MCMIS profile did not indicate any reportable crashes.

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[54] The FMCSA's interim final rule, which established the safety audit process for new entrant motor carriers, took effect on January 1, 2003. An upgraded final rule, which allowed automatic failures during safety audits for certain types of violations (e.g., operating without a CDL, if required), took effect on February 17, 2009; compliance was required beginning December 16, 2009. (73 *Federal Register*, no. 242, p. 76472.)

[55] The Commercial Vehicle Safety Alliance establishes OOS criteria. The finding of an OOS condition by a qualified inspector precludes further operation by the driver or of the vehicle, as appropriate, until the condition is corrected.

[56] The BASIC categories are (1) unsafe driving, (2) HOS compliance, (3) driver fitness, (4) controlled substances and alcohol, (5) vehicle maintenance, (6) hazardous materials compliance (if applicable), and (7) crash indicator.

[57] If a carrier does not violate the stipulations of 49 CFR 385.308, the carrier would successfully exit the program (this topic is further discussed in section 2.3.2). The FMCSA created a brochure describing the basic requirement for new entrants.

[58] After the carrier exited the new entrant program, it had 23 OOS violations before this crash.

[59] The roadside inspection OOS rates for freight-carrying motor carriers were retrieved from the FMCSA website showing roadside inspection OOS rates; the national average driver and vehicle OOS rates for 2018 were 5.1 percent and 21.9 percent, respectively. (The website was accessed April 16, 2020.)

[60] BASIC scores depend on the number of safety events, the severity of violations or crashes, and when the adverse safety events occurred (more recent events are weighted more heavily).

[61] The range of percentile scores for the three alert categories during these 4 months (February 2019–June 2019) were: 76–79 for unsafe driving, 73–84 for HOS, and 90–97 for driver fitness. BASIC thresholds for alert for freight motor carriers are 65 for unsafe driving and HOS and 80 for driver fitness. A carrier's BASIC score indicates its percentile rank compared with other similar carriers; for example, a score of 70 indicates that the carrier has scored worse than 70 percent of other carriers in that category.

The FMCSA uses carriers' OOS rates, among other factors, to determine BASIC scores, which the agency in turn uses to prioritize carriers for a compliance review (CR). Before this crash, Westfield Transport had not been subject to a CR. As a result of the Westfield Transport OOS violations in December 2017, the FMCSA sent the carrier a warning letter on January 12, 2018; such warning letters are sent only once and typically after the carrier's first OOS violation.[62] The FMCSA classified Westfield Transport as a moderate-risk carrier in February 2019, which would not prioritize it for a CR.[63] The date of a CR for a moderate-risk carrier depends on the date of the last review and the scores on BASIC; typically, the CR would occur within 12 months after a carrier meets the moderate-risk criteria. Carriers that are deemed *high risk* for 2 consecutive months receive priority and are placed on a mandatory list for a CR; carriers on this list typically receive a CR within 3 months.[64] Although Westfield Transport had three BASICs in alert status for 4 months, based on the FMCSA's defined criteria, the agency did not consider the carrier high risk.

1.7.4.3 Postcrash. After the crash, the FMCSA conducted a postcrash CR and issued an "unsatisfactory" safety rating to Westfield Transport.[65] The rating was based on 25 safety violations, five of which were acute and three critical (see table 4).[66]

Table 4. Safety violations identified in the postcrash compliance review.

Violations	Severity
Failing to implement a random controlled substances and/or alcohol testing program (49 CFR 382.305)	Acute
Allowing, requiring, permitting, or authorizing a driver to operate a commercial vehicle without a current CDL (49 CFR 383.37[a])	Acute
Making a fraudulent or intentionally false entry on a vehicle maintenance record (49 CFR 390.35)	Acute
Disabling or tampering with an ELD (49 CFR 395.8[e][2])	Acute
Using a disqualified driver (49 CFR 391.15[a])	Acute
Making or permitting a driver to make a false report of duty status (49 CFR 395.8[e][1])	Critical
Failing to require a driver to prepare a vehicle inspection report (49 CFR 396.11[a])	Critical
Using a commercial motor vehicle not periodiclly inspected (49 CFR 396.17[a])	Critical

[62] This topic is further discussed in section 2.3.2.2.

[63] The FMCSA defines a moderate-risk carrier as one that has (1) two or more of the following BASICs over intervention threshold: crash indicator, HOS compliance, unsafe driving, or vehicle maintenance, and (2) no intervention in the previous 12 months and no warning letters in the previous 6 months. After Westfield Transport was categorized as a moderate-risk carrier, it received 17 roadside inspections, which resulted in 8 OOS violations.

[64] The FMCSA defines a high-risk freight carrier as one that for at least two consecutive months has (1) a rating of least 90 percent in two of the following BASICs: crash indicator, HOS compliance, unsafe driving, or vehicle maintenance, and (2) no onsite inspection in the previous 18 months.

[65] An "unsatisfactory" rating means a preliminary determination that a motor carrier is unfit to continue operating in interstate commerce, and that prohibitions according to 49 CFR 385.13 will be imposed after 45–60 days if the necessary improvements are not made.

[66] Critical and acute violations are defined in 49 CFR Part 385 Appendix B.

Violations	Severity
Failing to obtain and place in a DQ file a motor vehicle record with medical certification (49 CFR 391.51[b][7][ii])	Noncritical
Using a driver before obtaining a negative preemployment drug test (49 CFR 382.301[a])	Noncritical*
Failing to provide educational material to driver pertaining to drug policies (49 CFR 382.601[a])	Noncritical
Failing to provide training in reasonable suspicion testing to designated staff (49 CFR 382.603)	Noncritical
Failing to maintain, for a 3-year period, an accident register (49 CFR 390.15[b])	Noncritical
Using a driver who has not submitted an employment application (49 CFR 391.21[a])	Noncritical
Failing to investigate driver's background (49 CFR 391.23[a])	Noncritical
Failing to investigate driver's background within 30 days of employment (49 CFR 391.23[c])	Noncritical
Failing to investigate driver's drug/alcohol history for the past 3 years (49 CFR 391.23[e][1])	Noncritical
Failing to maintain inquiries about driver's driving record in their DQ file (49 CFR 391.51[b][2])	Noncritical
Operating a commercial motor vehicle outside laws and regulations of the jurisdiction in which it is being operated (49 CFR 392.2)	Noncritical
Requiring or permitting a driver to operate after 14 hours of duty (49 CFR 395.3[a][2])	Noncritical*
Requiring or permitting a driver to drive for more than 11 hours (49 CFR 395.8[a][3][i])	Noncritical*
Failing to obtain from a driver a signed statement of total on-duty hours in the preceding 7 days (49 CFR 395.8[j][2])	Noncritical
Failing to keep a record of nature and due dates of vehicle inspection and maintenance operations to be performed (49 CFR 396.3[b][2])	Noncritical
Failing to keep a record of inspections, repairs, and maintenance that were performed (49 CFR 396.3[b][3])	Noncritical
* Because less than 10 percent of drivers were subject to these violations, they remained noncritical; otherwise, the violations would become critical according to 49 CFR 385.	

During the postcrash on-site CR, the FMCSA investigator initiated a process to issue an imminent hazard (IH) order for the carrier. According to 49 CFR 386.72, "imminent hazard means any condition of vehicle, intermodal equipment, employee, or commercial motor vehicle operations that substantially increases the likelihood of serious injury or death if not discontinued immediately."[67] An IH order can be issued for any motor vehicle carrier; hazardous material, passenger, or freight carrier. According to 49 CFR 386.72, the FMCSA can issue an IH order for a freight motor carrier of nonhazardous material under these circumstances:

[67] For more detailed information on defining IH orders and the required circumstances for their issuance, see 49 CFR 386.72.

> (b)(1) Whenever it is determined that a violation of 49 U.S.C. 31502 or the Motor Carrier Safety Act of 1984, as amended, or the Commercial Motor Vehicle Safety Act of 1986, as amended, or a regulation issued under such section or Acts, or a combination of such violations, poses an imminent hazard to safety, the Director of the Office of Enforcement and Compliance or a Division Administrator, or his or her delegate, shall order: (i) A commercial motor vehicle or employee operating such vehicle out-of-service, or order an employer to cease all or part of the employer's commercial motor vehicle operations, as provided by 49 U.S.C. 521(b)(5); . . .

The FMCSA investigator recommended that an IH order be issued for Westfield Transport based on a worksheet that considers several factors, including the number of critical safety violations, whether the postcrash CR rating was unsatisfactory, and the number of fatalities in the crash. However, the FMCSA determined that the case against Westfield Transport did not rise to the level of IH and subsequently did not issue the IH order. On August 16, 2019, Westfield Transport updated its MCMIS profile, notifying the FMCSA that the carrier was no longer in business.

During the on-scene investigation, NTSB investigators discovered that the owner of Westfield Transport owned another motor carrier—East Transport, LLC—which in November 2018 had received operating authority to transport automobiles. According to the carrier's MCMIS profile, East Transport had one truck and one driver, both of which were also used in Westfield Transport operations. Because such activities are typical of potentially *reincarnated* carriers, NTSB investigators informed the FMCSA of the two businesses.[68] Based on this information, the FMCSA attempted to conduct a new entrant safety audit on East Transport, but the carrier failed to respond to the audit request.[69] As a result, the FMCSA notified the carrier that it would be subject to OOS and revocation of operating authority. On August 19, 2019, East Transport updated its MCMIS profile, notifying the FMCSA that the carrier was no longer in business.

The NTSB sought clarification from the FMCSA regarding the administration's decision not to issue an IH order for Westfield Transport. In its response, the FMCSA stated:

> . . . This analysis includes a comprehensive look at the facts and circumstances of the violations discovered during the compliance review to determine if that standard was met. In this case, the analysis of the violations discovered concluded the imminent hazard standard was not met; noting that none of the violations discovered impacted the June 21, 2019 crash. Also, as stated above, it is clear the company is now defunct and no longer operating.

In the response, the FMCSA also discussed East Transport, stating:

[68] Furthermore, NTSB investigators examined the history of Westfield Transport to uncover common factors that would indicate a reincarnated carrier. This information and additional discussion regarding reincarnated carriers are presented in section 1.7.5.

[69] East Transport was a participant in the new-entrant safety program at the time of the Randolph crash, but it had not yet undergone a safety audit.

> There is no prohibition against operating more than one motor carrier, unless such operations are for the purpose of evading FMCSA's oversight. . . . According to the records of the Commonwealth of Massachusetts, East Transport, LLC filed a Certificate of Cancellation notifying the Commonwealth that it had ceased all operations. FMCSA has no evidence to support a conclusion that East Transport, LLC continues to operate as a motor carrier subject to FMCSA's jurisdiction.

1.7.5 Reincarnated Carriers

On discovering that the owner of Westfield Transport also owned East Transport, NTSB investigators analyzed the history of Westfield Transport to determine whether the company had developed an infrastructure to become a *reincarnated carrier*. When a motor carrier reestablishes the company under another name, with a new USDOT number or new location in an attempt to avoid FMCSA oversight, it is referred to as a reincarnated carrier. A carrier might take such action—which is illegal under 49 CFR 385.1005—to avoid (1) complying with an FMCSA order, (2) complying with a statutory or regulatory requirement, (3) paying a civil penalty, (4) responding to an enforcement action, or (5) being linked with a negative compliance history.[70] Reincarnated carriers are defined as those "with common ownership, common management, common control or common familiar relationship."[71]

As part of the investigation into Westfield Transport, NTSB investigators reviewed information about the carrier, contact information, addresses, drivers, and vehicle identification numbers (VIN) to uncover common factors indicating the extent to which Westfield Transport reincarnated into or from other carriers. The analysis found at least 21 other potential motor carriers—including East Transport—that have commonality or affiliations with Westfield Transport, strongly indicating a reincarnated-carrier scenario (see table 5). One carrier, DAKS Express, has its principal place of business associated with the crash-involved driver. The manager of another carrier—East2West Transport—worked as a driver at Westfield Transport. East2West Transport also employs the driver who worked at Westfield Transport with a suspended license.

Table 5. Motor carriers affiliated with Westfield Transport.

Carrier Name	Starting Date of Operation	Shared Elements	Status [a]
East Transport	11/26/2018	Owned by same principals, same address	OOS; safety audit refusal
East2West Transport	08/22/2019	Manager worked as driver at Westfield Transport; Driver with suspended license at Westfield employed as driver	Active (in new entrant program)
3 Brothers Transport	01/17/2017	Same email and vehicle tag	Active

[70] Title 49 CFR 382.1005 states, "Two or more motor carriers shall not use common ownership, common management, common control, or common familial relationship to enable any of all such motor carriers to avoid compliance, or mask or otherwise conceal non-compliance, or a history of non-compliance . . ."

[71] See 49 CFR 385.1003 for a complete definition of a reincarnated carrier.

Carrier Name	Starting Date of Operation	Shared Elements	Status [a]
Hgl Transport	06/13/2011	Shared VIN	Active
County Transport Inc	06/21/2018	3 of same vehicles (same plates and VIN)	OOS; safety audit refusal
Ec Transport	03/02/2018	Shared driver and 2 shared vehicles	Active
Njc Transport Inc	01/04/2018	2 shared vehicles	Inactive
Belaz Inc	08/13/2010	Shared VIN	Active
Vlad Transport		Principal place of business associated with the crash-involved driver; accident driver worked as dispatcher	No USDOT No[b]
DAKS Express	03/27/2015	Principal place of business associated with the crash-involved driver; same address as Vlad's Transport; shared driver	Active
Kb Xpress Corp	11/ 17/ 2017	Shared driver; this driver became manager at East2West Transport	Active
Walker Transport	08/ 27/ 2009	Shared VIN	Inactive
Teto Express Inc.	05/ 10/ 2019	Shared VIN	OOS; safety audit refusal
8 Additional Carriers [c]	Nov 1997 – Jul 2019	Shared one driver	6 are active 2 are inactive

[a] OOS indicates that the USDOT had revoked the carrier's operating license. Inactive indicates that the carrier did not renew the operating license. Status is current as of October 2020.

[b] Vlad Transport is a medical transport company and does not require a USDOT number.

[b] Eight additional motor carriers (with the start of their operation ranging from 1997 to after the Randolph crash) employed one of the Westfield Transport drivers.

1.8 Interstate Communication about License Suspensions

1.8.1 Regulation of Driver's Licenses

The federal standards pertaining to a CDL are specified by federal regulations, while states regulate the requirements for noncommercial driver's licenses. States can also impose additional requirements for CDLs that are higher than the federal standards. The provisions of 49 CFR 383.1 include establishing (1) testing and licensing requirements for commercial motor vehicle operators (2) requirements for state-issued CDL documentation, and (3) "periods of disqualification and penalties for those persons convicted of certain criminal and other offenses and serious traffic

violations, or subject to any suspensions, revocations, or cancellations of certain driving privileges."[72]

States' compliance with the federal regulation of the CDL program is dictated under 49 *United States Code* (USC) 31311. As part of this compliance, states are required to meet minimum standards under 49 CFR 384, subpart B. Minimum standards include those pertaining to (1) disqualification for driving under the influence, (2) penalties for noncommercial motor vehicle violations, (3) notification of CDL disqualification and of traffic violations, and (4) maintaining CDLIS driver record-keeping.[73]

States are required to inform a license-issuing state within 10 days after suspending driving privileges of a CDL holder, although the regulation does not prescribe the specific method of notification, such as electronic or paper.[74] However, the regulation does stipulate that an electronic notification must be sent through CDLIS. Additionally, according to FMCSA guidance, states should not send duplicate notifications—both electronic and paper—of violations and license suspensions.

Federal regulations also prescribe CDL disqualification criteria for various offenses. For example, pursuant to 49 CFR 383.51, the penalty for being under the influence of a controlled substance when operating a noncommercial vehicle is CDL disqualification for 1 year for the first such offense and a lifetime for the second such offense.[75]

1.8.2 Pickup Truck Driver's License Suspension in Connecticut

While operating his private vehicle in East Windsor, Connecticut, on May 11, 2019, the driver was stopped by officers from the local police department who suspected him of being under the influence of drugs.[76] The officers administered a standardized field sobriety test, which the driver did not pass. He was therefore arrested for operating a motor vehicle under the influence of drugs/alcohol. The officers then administered a breathalyzer test for alcohol, which was negative. When the officers requested that the driver submit to a urine drug test, he refused.

Under Connecticut law, arrested drivers who refuse to submit to toxicological testing will have their Connecticut driver's license immediately revoked and seized by the arresting officer, or their driving privileges suspended for a 24-hour period if licensed in another state.[77] After the 24-hour period ended, the driver's refusal to submit to a urine drug test resulted in suspension of his

[72] See 49 CFR 383.1 for additional provisions of this regulation.

[73] See 49 CFR 384, subpart B for complete list of minimum standards for state compliance.

[74] According to 49 CFR 384.208, "No later than 10 days after disqualifying a [commercial learner's permit] or CDL holder licensed by another State . . . the State must notify the State that issued the license of the disqualification."

[75] See 49 CFR 383.51, table 1, for the complete list of disqualification criteria.

[76] The police department received a call about a driver who was revving the vehicle engine and jumping outside and around the vehicle.

[77] (a) Connecticut general statute 14-227b(a) (2019) provides for implied consent to chemical analysis of an operator's blood, breath, or urine. (b) Connecticut general statute 14-227b(c) provides for an immediate 24-hour revocation of a Connecticut driving license or nonresident driving privileges for refusing to submit to a properly requested chemical analysis of the driver's blood, breath, or urine. (c) Connecticut general statute 14-227a (2019) provides penalties for conviction of operating under the influence of alcohol or other drugs.

nonresident driving privileges in Connecticut for 45 days, with a further requirement for an ignition interlock device for 1 year following restoration of his nonresident driving privileges.[78] The Connecticut statute does not distinguish between a personal driver's license and a CDL; all driving privileges in the state would be suspended.

If a Massachusetts-licensed driver commits an offense in another state related to operating under the influence of alcohol or other drugs, including chemical test refusals and failures, Massachusetts views such an offense as if it occurred in Massachusetts.[79] Under Massachusetts law, if a CDL holder has his license or right to operate suspended, revoked, or canceled in another state or country, that driver's Massachusetts license shall be immediately revoked without a hearing.[80] A driver holding a Massachusetts CDL who is convicted of refusing to submit to a chemical test or analysis of the person's breath or blood after operating a commercial or noncommercial vehicle is prohibited from operating a commercial vehicle for at least 1 year, for the first offense.[81]

1.8.3 Processing of Pickup Truck Driver's Suspension Notification

On May 29, 2019, the Connecticut DMV sent an electronic notification—through CDLIS—to Massachusetts to inform the state about the suspension of the driver's nonresident driving privileges. The notice included the type of violation and listed a citation date of May 11, 2019, with a conviction date of June 10, 2019.[82] Immediately after the suspension notice was entered, CDLIS sent an electronic notification to the Massachusetts RMV. The notification was received by the RMV's dedicated software—ATLAS.[83] Because the conviction date was 11 days in the future—the notice was received on May 29—ATLAS automatically diverted the notice into a queue that required manual processing.

At the time of the crash, ATLAS was configured not to automatically process notifications about license revocations or suspensions with an effective date in the future. However, RMV personnel were not reviewing the queue and failed to manually process the electronic notification about the driver's suspension of his nonresident driving privileges in Connecticut (sections 1.8.4 and 1.8.5 further discuss the RMV limitations in processing out-of-state electronic notifications). Because ATLAS did not automatically process the electronic notification, the Connecticut DMV did not receive a confirmation that the Massachusetts RMV had received the electronic notification.

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[78] (a) Connecticut general statute section 14-227a (g) provides provisions for automatic penalties after the initial 24-hour license suspension. The automatic penalty among other items may include "such person's motor vehicle operator's license or nonresident operating privilege suspended for forty-five days." (b) Ignition interlock devices are designed to detect and measure alcohol in users' breath; they do not detect other types of drugs.

[79] See Massachusetts general law part I, title XIV, chapter 90, section 22(c). The website was accessed May 3, 2020.

[80] See Massachusetts general law chapter 90F, section 8. Such drivers may reapply for their Massachusetts license after the out-of-state license is reinstated.

[81] See Massachusetts general law chapter 90F, section 9(A)(4).

[82] Connecticut general statute 14-227b(e)(1) provides for the effective date of suspension of license or nonresident driving privileges, stating that "…date shall be not later than thirty days after the date such person received notice of such person's arrest by the police officer."

[83] ATLAS was developed specifically for the RMV.

As a result of the RMV's failure to accept and process the electronic notification, the Connecticut DMV sent a paper notification to the Massachusetts RMV. The registry received the paper notice on June 4, 2019. The Merit Rating Board (MRB), a department in the RMV, was responsible for processing paper notifications from other states concerning infractions by Massachusetts-licensed drivers; the MRB was also responsible for processing in-state notifications. However, the MRB failed to process the paper notification about the driver's suspension of his nonresident driving privileges in Connecticut before the Randolph crash (sections 1.8.4 and 1.8.5 further discuss the MRB failures to process out-of-state paper notifications). Postcrash, Massachusetts suspended the driver's license indefinitely under the imminent threat provisions of the Massachusetts General Laws.[84]

1.8.4 Postcrash Remediation of Out-of-State Notifications

Following the crash and on learning that the driver's Connecticut operating privileges had been revoked, the RMV examined ATLAS and found 365 unprocessed electronic notifications in the manual queue; all of these notifications were for CDL drivers. Nearly all of them—362—were duplicates of reports already adjudicated. Of the remaining three notifications, only one—pertaining to this driver—warranted an automatic license suspension. The remaining two notifications were alcohol-related but did not warrant automatic suspension.

The RMV also examined its processing of out-of-state paper notifications. Over the next few weeks, the RMV discovered tens of thousands of unprocessed out-of-state paper notifications. At that time, the RMV began processing the backlog. On July 12, 2019, the RMV reported that the department had processed all paper notifications, resulting in license suspensions for 1,607 drivers. However, as further discussed in section 1.8.5, the RMV's processing of the backlog had numerous flaws.

Additionally, the RMV initiated a check of all 5.2 million Massachusetts driver's licenses against the records in the National Driver Register (NDR).[85] On September 16, 2019, the RMV reported that the department had suspended an additional 1,869 drivers based on the check of the NDR.[86] At that time, the RMV reported that 5,260 drivers had their licenses suspended since the crash.[87] During a meeting with NTSB investigators in June 2020, the RMV stated that it was completing the reprocessing of all out-of-state paper notifications to ensure that all of them were

[84] (a) See suspension notice attachment of the human performance factual report in the public docket of this investigation (HWY19MH010). (b) The imminent threat provisions of the Massachusetts general laws are found in chapter 90 § 22(a) and chapter 90F § 9(G). Specifically, part I, title XIV, chapter 90, section 22, states "The registrar may suspend or revoke without a hearing any certificate of registration or any license issued under this chapter whenever the holder thereof has committed a violation of the motor vehicle laws of a nature which would give the registrar reason to believe that continuing operation by such holder is and will be so seriously improper as to constitute an immediate threat to the public safety."

[85] The NDR is a division of NHTSA. The NDR maintains a computerized database known as the Problem Driver Pointer System that contains information regarding license revocation, suspension, cancelation, or denial of driving privileges. If a driver has a record of a serious infraction or suspension in a state, the NDR "points" to the particular state where such a record exists.

[86] "More than 5,200 Massachusetts Driver's Licenses Suspended Amid RMV Review, Acting Registrar Says" (link to MassLive Media, accessed August 21, 2020).

[87] Some of the remaining suspensions were the result of new violations occurring after the crash.

processed correctly. The RMV further stated that the vast majority of the violations that required license revocation were for non-CDL drivers.

1.8.5 External Postcrash Examination of RMV Operations

While the RMV was completing its internal audit and processing the newly found electronic and paper notifications, the RMV commissioned Grant Thornton LLP to conduct an external review of its operations. The review started on July 10, 2019, and examined the RMV's procedures for processing electronic and paper out-of-state notifications before the crash. The evaluation also examined the factors that contributed to the RMV's failure to process the notification from Connecticut to suspend the driver's nonresident driving privileges. The external review was completed on October 4, 2019, with a final report that included conclusions about the state of RMV operations at the time of the crash and recommendations for organizational changes and process improvements.[88]

The final report listed several critical findings pertaining to the RMV's precrash practices, for example, that the ATLAS manual queue was not being monitored at the time of the crash. Moreover, none of the notifications in the queue had been processed since March 26, 2018, when ATLAS became operational. At that time, the RMV assigned a team—the SPEX unit—to monitor the queue.[89] However, no specific member of this team was assigned to or accepted responsibility for monitoring, and the RMV provided no oversight. The review also found that the RMV had stopped processing out-of-state paper notifications in 2013. At that time, the Driver Control Unit, a division of the RMV, was responsible for processing out-of-state paper notifications. In the fall of 2016, because of the continually increasing backlog of unprocessed out-of-state paper notifications, the RMV registrar transferred the responsibility for processing those notifications to the MRB. The RMV also hired a third-party contractor to assess the optimal processing of the backlog and discussed such approaches with the MRB. However, processing of the backlog did not begin.

When ATLAS became operational in March 2018, the then MRB director notified the RMV registrar that the rating board was having trouble adapting to the new software, which made it challenging to process both (newly received) in-state and out-of-state paper notifications. On learning about the difficulties, the RMV registrar instructed the MRB director to prioritize processing in-state paper citations. Further, Grant Thornton also ascertained that the three-member MRB board had held no meetings since 2015. Postcrash, the board met in August 2019, and decided to terminate the MRB director.[90]

The external review identified the following contributory factors in the RMV failure to process the notifications: (1) "Massachusetts has had a long-standing policy of not prioritizing the

[88] See *Commonwealth of Massachusetts–Registry of Motor Vehicles* attachment to the human performance factual report in the public docket of this investigation (HWY19MH010).

[89] According to the Massachusetts Department of Transportation, SPEX is a unit that handles information from state-to-state pointer exchange service.

[90] Massachusetts general law section 57A states that the MRB should reside with the RMV and be led by a three-member board consisting of the registrar of motor vehicles (who serves as the chair), the commissioner of insurance, and the attorney general or a designee. This board, chaired by an acting registrar (see section 1.8.6), terminated the MRB director.

processing of out-of-state notifications," (2) "the RMV lacked effective operational control," and (3) "risk management over the RMV was inadequate."[91]

Grant Thornton also examined the RMV's postcrash remediation of the newly discovered out-of-state paper notifications, including randomly sampling notifications to determine the thoroughness and accuracy of processing.[92] The reviewer found five boxes that the RMV missed during the remediation process; furthermore, about 4 percent of the sampled notifications were either erroneously classified as nonegregious, or suspensions in other states were incorrectly determined.[93] Grant Thornton discussed these findings with the RMV, after which the registry reprocessed the incorrect paper notifications.

The final report's numerous recommendations were in six areas: (1) governance and control mechanisms, (2) electronic out-of-state notifications, (3) paper out-of-state notifications, (4) training, (5) resources, and (6) organizational structure. Several recommendations related directly to the factors that led to the RMV's failure to process the driver's out-of-state suspension. Grant Thornton recommended that the RMV:

- Coordinate with the ATLAS developer to establish a clear relationship between work items, work queues, and work groups.

- Consider whether the updated configuration of ATLAS—which allows for suspensions with an effective date of 1 year in the future—is reasonable based on other states' practices.

- Institute regular use of the monthly CDLIS Timeliness and Accuracy summary workbook, as a benchmark tool to evaluate the RMV's performance—timeliness and accuracy of outgoing CDL notifications—against other jurisdictions.[94]

- Identify areas in which additional training would be beneficial to employees and provide appropriate training in the identified areas.

- Develop a process to document the workflow of all major processes and update standard operating procedures.

[91] See *Commonwealth of Massachusetts–Registry of Motor Vehicles*, pp. 12–14, attachment to the human performance factual report in the public docket for this investigation (HWY19MH010).

[92] As part of the remediation process, on reading the paper notifications, RMV staff determined for each one whether the infraction constituted an egregious violation or not. Those deemed egregious were further processed to determine whether the affected licensees had their driving privileges suspended in other states and whether they were already suspended in Massachusetts.

[93] (a) Of the 100 processed notifications that were deemed to contain an egregious infraction, the RMV failed to determine that four licensees had suspensions in other states. (b) Examples of egregious violations include careless or reckless driving or various drug/alcohol-related offenses, such as driving while impaired or failure to submit for alcohol or chemical drug test.

[94] The CDLIS Timeliness and Accuracy Summary Workbook is prepared by AAMVA. The system tracks the accuracy and timeliness of outgoing CDL notifications—informing a state that issued a CDL when its driver has their driving privileges suspended in another state.

- Consider the risk of not immediately suspending a driver with an impending out-of-state suspension and evaluate the feasibility of accelerating the suspension in Massachusetts.

- Create one unit, under the Enforcement Division, to be responsible for all matters related to the processing and adjudication of any out-of-state notifications (both incoming and outgoing) for CDL and non-CDL licenses.

In its final report, Grant Thornton also recommended that Massachusetts DOT Audit Operations, on a frequent basis, evaluate the design and operating effectiveness of the out-of-state notification process (both incoming and outgoing) for CDL and non-CDL licenses.

1.8.6 Postcrash Changes by the RMV

The RMV registrar resigned on June 25, 2019, and the RMV appointed an interim registrar. As the RMV was completing its internal audit and processing the backlog of out-of-state electronic and paper notifications, the registry initiated several organizational and process changes. Many of the changes were in response to the Grant Thornton recommendations.

The RMV created an Out-of-State Unit, responsible for processing both electronic and paper out-of-state notifications. The Out-of-State Unit implemented a new process requiring all out-of-state paper notifications regarding offenses warranting suspension to be processed within one business day. This requirement includes notifications with a future suspension date; an egregious violation committed in another state could result in the immediate suspension of a Massachusetts license before the stated suspension date on the notification. In support of this process, the unit established a mechanism to provide managers with daily updates about the status of paper notifications. The RMV also established a new position—deputy registrar for safety—tasked with overseeing the Out-of-State Unit.

On May 21, 2020, the RMV informed NTSB investigators that the Out-of-State Unit was continuing to process the backlog of paper notifications discovered postcrash.[95] Furthermore, the RMV made changes in the processing of electronic CDLIS notifications. In March 2020, the RMV transferred the SPEX unit to the control of the Out-of-State Unit. The Out-of-State Unit assigned specific personnel in SPEX to regularly monitor the electronic CDLIS notifications in ATLAS, ensuring that they would be processed in a timely manner either automatically or manually. In support of this process, the Out-of-State Unit established a mechanism to provide managers with daily updates about the status of electronic notifications.

The RMV's MRB retained the responsibility for processing in-state notifications from courts and law enforcement. The RMV appointed a new MRB director who instituted regular public meetings of the MRB board. The Grant Thornton audit of MRB operations revealed a significant backlog of in-state citations. In a May 21, 2020, communication with NTSB investigators, the RMV stated that the MRB completed processing the backlog in April 2020.

[95] E-mail conversation with the RMV chief compliance officer on May 21, 2020. In the updated communication on October 6, 2020, the RMV stated that the Out-of-State Unit had not yet completed the process.

The RMV also changed the processing of infractions and suspensions of driving privileges for non-Massachusetts-licensed drivers. Before this crash, the RMV was not informing other states when a nonresident, non-CDL driver had their driving privileges suspended in Massachusetts. Postcrash, the RMV initiated a policy to mail such notifications to the licensing states. The suspension information about CDL drivers continues to be entered into CDLIS, as was the practice before the crash.

1.9 Weather and Roadway Conditions

Data from the weather station at Mount Washington Regional Airport in Whitefield, New Hampshire, about 9.5 miles west of the crash site, indicated that at 6:52 p.m. on June 21, 2019, the temperature was 66°F, with northwest winds at 12 mph. Data showed no precipitation on the day of the crash, and 0.64 inches of rain the previous day. Visibility was at least 10 miles and sunset was at 8:33 p.m., indicating that the crash occurred during daylight. NTSB investigators examined the position of the sun at the time to determine the possibility of a glare. Although the sun was in the forward field of view of the driver at the time of the crash, its altitude was high enough not to cause glare for the driver.

2. Analysis

2.1 Introduction

A pickup truck towing an unladen vehicle-hauling trailer was westbound on US-2 in Randolph, New Hampshire, when it crossed the centerline of the road and collided with a group of motorcyclists traveling east. Seven motorcycle riders and passengers died and seven were injured; the pickup truck driver was uninjured.

2.1.1 Exclusions

As a result of its investigation, the NTSB established that the following did not cause or contribute to the crash:

- ***Driving experience of pickup truck driver and motorcycle riders:*** Although the pickup truck driver had been driving heavy vehicles for less than a year, his limited time operating them would not have affected his driving performance on a sparsely traveled road and in fair weather and roadway conditions. The motorcycle riders had considerable experience riding motorcycles.

- ***Cell-phone distraction by pickup truck driver:*** Cell phone records gave no indication that the pickup truck driver was engaged in texting or a cell phone conversation at the time of the crash.

- ***Mechanical condition of the combination vehicle and the motorcycles:*** NTSB investigators examined the combination vehicle and did not identify any preexisting mechanical conditions that might have contributed to the crash. The investigators documented the damage to the motorcycles and determined that it was crash-related.

- ***Highway design:*** The configuration of the road met the roadway design recommendations. The speed limit of 50 mph was appropriate for the crest vertical curve in the area of the crash and provided sufficient stopping sight distance. Furthermore, the average daily traffic count and the crash history of the area did not indicate a potentially hazardous location.

- ***Weather:*** There was no precipitation at the time of the crash, the road surface was dry, and the visibility was good.

The NTSB therefore concludes that none of the following were factors in the crash: (1) driving experience of the pickup truck driver and motorcycle riders; (2) cell-phone distraction by the pickup truck driver; (3) mechanical condition of the combination vehicle and the motorcycles, (4) highway design; and (5) weather conditions.

As a result of its investigation, the NTSB determined that the allocation of emergency response was adequate, emergency responders were immediately dispatched, and appropriate communication protocol was followed. The NTSB therefore concludes that the emergency response to the crash was timely and appropriate.

2.1.2 Pickup Truck Driver Actions

Multiple witnesses reported seeing the combination vehicle driving erratically or intruding into the opposite lane of travel; one account described a lane intrusion less than a minute before the crash. Further, the first roadway evidence of the collision events indicated that the left-side wheels of the pickup truck were on the highway centerline when the first motorcycle—the one leading the formation—was struck. Based on the physical evidence, the lead motorcyclist was traveling in close proximity to the highway centerline at the time of impact, and although that motorcycle's tires were inside the travel lane, its front fairing most likely overhung the highway centerline.[96]

The pickup truck's tire mark resulting from this initial collision with the lead motorcycle had a shallow heading of about 2.5 degrees, indicating a gradual departure from the westbound travel lane into the oncoming lane. The roadway evidence and the postcrash vehicle examination shows that as the pickup truck struck the second motorcycle (position 3 in the formation), the truck's tie rod separated, which along with the deflated front left tire, caused a sharper leftward movement—with a heading of about 17 degrees—into and across the eastbound lane.

The parallel tire friction marks that start about 166 feet east of the truck's final rest position were clearly identified as being created by the pickup truck. Although hard braking also causes friction/skid marks, the marks identified at the scene are more consistent with displacement related to impact and tire instability. However, braking after the first impact cannot be excluded or confirmed. A deceleration of 50–60 mph along 166 feet of roadway is consistent with hard braking but excludes consideration for multiple motorcycle collisions and furrowing into the soil.[97] Therefore, the driver's application of brakes after the first impact—or the force with which they might have been applied—cannot be determined.

The pickup truck driver told police that he was reaching for a drink moments before the crash, which caused him to cross the centerline. However, this explanation is inconsistent with witness reports. Several witnesses reported seeing the driver operate erratically earlier that day, and one witness reported seeing the truck crossing the centerline less than a minute before the crash.

NTSB investigators examined whether the pickup truck driver's loss of control and lack of proper corrective action could have been due to fatigue. Although he had incurred a significant sleep deficit 3 nights before the crash, he had sufficient time for rest during the 2 nights before the

[96] (a) A motorcycle *fairing* is a shell fitted around the front of a motorcycle to improve aerodynamics and rider comfort. (b) To determine the likely position in the lane of the motorcycle leading the formation, NTSB investigators considered motorcycle damage and the dimensions of a similar Harley Davidson model on which the front tire fairing, the handlebars, and the rider footrest extended 20, 10, and 8.5 inches outboard of the engine block, respectively. The nominal height of the components and the damage to the lead motorcycle were consistent with the deformation of the pickup truck's left front fender, tire, and wheel assembly and with a location close to the highway centerline at impact. (c) For a complete crash reconstruction, see the document in the public docket for this investigation.

[97] The 50–60 mph range includes the speed limit on this section of US-2 and the speed of the combination vehicle estimated by the witness driving behind it.

crash, which should have relieved the sleep debt. However, it is unclear to what extent the driver's drug use may have exacerbated the lingering effects of the sleep debt.[98]

The accounts by multiple witnesses of erratic driving, as well as the results of toxicological testing, support another, more credible explanation. The analysis of the pickup truck driver's blood—which was collected about 2 hours after the crash—identified several highly impairing substances, including fentanyl, morphine, acetyl fentanyl, and metabolites of cocaine, heroin, and fentanyl.[99] Beyond the toxicology results, the driver also had a long history of drug use and drug-related offenses, including suspected drug use at a previous motor carrier and driving-under-the-influence-(DUI)-related offenses. The driver told police postcrash that he had used heroin and cocaine on the morning of the crash.[100]

The effects of cocaine on driving-relevant attributes, such as attentiveness, awareness, and caution, can vary considerably. Individuals in drug abuse treatment self-report experiencing very high but also very low levels of those attributes while using (MacDonald and others 2008). However, objective analysis of the impact of cocaine use on driving shows that cocaine users are significantly more likely to be involved in a collision (Stoduto and others 2012). Typical findings in laboratory studies examining the impact of fentanyl show decreased performance in various perception, attention, and memory tasks (Schneider and others 1999). Chronic use of heroin has shown to have lasting effects, exhibited by impaired executive functioning and increased response time (Pau, Lee, and Chan 2002; Lyvers and Yakimoff 2003; Liu and others 2006). An immediate effect of heroin use includes intense euphoria followed by a feeling of heaviness in the extremities and alternating states of wakefulness and drowsiness (NHTSA 2004).

The levels of the substances found in the driver's blood and his statement to police about the time of his last use indicate that the driver had recently—within 12 hours of the crash—used those substances. Because of the several impairing drugs in the driver's blood, a definitive determination of impairment due to any single substance or the combination of them was not possible.[101] Moreover, the impairing effects of heroin, cocaine, and fentanyl continue beyond those attributed to the user's *high* (that is, when the drug's blood concentration is the highest). Feelings of dysphoria when coming down from the high impair the user's attention, awareness, and response time, which are the essential attributes of a safe driver. The NTSB therefore concludes that the pickup truck driver's crossing of the centerline occurred because of his impairment from use of multiple drugs.

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[98] The effects of the detected drugs in the driver's system would vary depending on the time of use. Based on the general effects of these drugs, the driver's self-reported time of their use, and his description of the effects at the time of the crash, the most likely overall effect of the drugs would be to enhance any effects of fatigue. However, given the relatively low sleep debt that the driver experienced, the resulting effect of fatigue would have been substantially less than the effect of drugs/drug cravings.

[99] According to 49 CFR 392.4, commercial vehicle drivers are prohibited from using impairing substances while on duty.

[100] From the available evidence, including the toxicology results, we are unable to determine the exact time of the driver's last drug use before the crash.

[101] Certain drugs are commonly taken together for their combined effects. With a particular combination of cocaine and heroin, if taken at the same time, the cocaine is more quickly metabolized by the body, which may leave the user experiencing particularly pronounced negative side effects of the heroin, such as fatigue and drowsiness.

2.1.3 Safety Issue Areas

The following analysis examines one of the main factors that affect the general safety of highway transportation, specifically, how states communicate with each other about driver infractions and suspensions, and the consequences of the lack of such communication. The analysis also examines federal oversight of several motor carrier safety-related issues, including the FMCSA's (1) effectiveness in overseeing new motor carriers and those that have recently completed the probationary period, (2) oversight of ELD providers that do not meet the federal standards, and (3) use of its authority to remove particularly hazardous motor carriers from operation. Finally, the analysis explores issues pertaining to motorcycle safety, including technological solutions—such as broad implementation of ABS—as well as behavioral countermeasures, such as helmet use, unimpaired riding, and adequate spacing when riding in groups. As a result, the analysis is segmented into three main safety issues:

- **Deficiencies in out-of-state driver's license notification processing.** Considered are the deficiencies in the RMV operations, oversight, and policies, as well as notification processing in other states and jurisdictions, notably:
  - RMV precrash operational failures and postcrash process and organizational improvements (section 2.2.1).
  - Communication between states (section 2.2.2).
- **Insufficient federal oversight of motor carriers.** Considered are the failures of Westfield Transport in adhering to basic federal requirements, and the deficiencies in FMCSA oversight of motor carriers that recently completed the new entrant program, use of available corrective mechanisms, and oversight of ELD providers. Specifically:
  - Westfield Transport operational and oversight failures (section 2.3.1).
  - FMCSA oversight of new motor carriers, and of carriers that have recently exited the new entrant program (section 2.3.2).
  - FMCSA oversight of ELD providers (section 2.3.3).
  - FMCSA use of imminent hazard orders (section 2.3.4).
- **Shortcomings in motorcycle rider safety.** Considered are motorcycle-based technologies that might help a rider avoid a crash, as well as behavioral measures that can affect the safety of motorcycle riding. Specifically, this safety issue examines:
  - The impact of ABS on the motorcycles in this crash and the overall safety benefits of that technology (section 2.4.1).
  - The overall safety benefits of wearing USDOT-compliant helmets (section 2.4.2).
  - The risks of alcohol impairment and inadequate spacing between motorcycles riding in groups (section 2.4.3).

2.2 Out-of-State Notification Processing

The pickup truck driver's precrash driving record illustrates a history of consistently unsafe behavior that includes a recent crash and a DUI-related offense. A driver with such a record would be considered unsuitable for employment by any motor carrier that values safety (as further discussed in section 2.3). However, it is not only the hazardous-driving record that should have disqualified the driver from working as a commercial driver; his suspended driver's license (CDL and non-CDL) should have prevented him from operating a vehicle at the time of the crash. Although this investigation revealed the specific failures of the driver, the carrier, and the RMV that led to the crash, it also highlighted a broader area of significance—interstate communication about license suspensions and infractions.

2.2.1 Massachusetts RMV Operations

2.2.1.1 Precrash Notification Processing. On May 11, 2019, the pickup truck driver had his driving privileges suspended in Connecticut for refusing to submit to a chemical drug test. Connecticut entered the suspension into CDLIS, which sent an electronic notification to the Massachusetts RMV, the state that issued the driver's CDL. After not receiving confirmation that the electronic notification had been processed, the Connecticut DMV sent a paper notification about the suspension to the Massachusetts RMV. Despite receiving a suspension notification by two different means, the RMV failed to process either of them. Postcrash examination of RMV operations showed that it largely ignored paper notifications from other states about infractions and loss of driving privileges by Massachusetts-licensed drivers.

At the time of the crash, the RMV relied on software—ATLAS—to process electronic CDL notifications. Because of design limitations in ATLAS, some electronic notifications could not be automatically processed and were sorted into a queue that required human input. The RMV was not processing those notifications or even monitoring the manual queue. Between March 2018, when the RMV activated the software, and the time of the crash, 365 electronic notifications went unprocessed. Nearly all the notifications were duplicates of reports that had already been received and processed by alternative means (paper notification). Only three electronic notifications were never adjudicated, including the one for the pickup truck driver involved in this crash.

The RMV's organizational deficiencies adversely affected not only the processing of electronic notifications about CDL drivers in the manual queue of ATLAS; they also resulted in a failure to process paper out-of-state notifications, the majority of which were for non-CDL drivers. The notifications about infractions by non-CDL drivers were exclusively communicated on paper and mailed; however, because the RMV had largely abandoned the processing of out-of-state paper notifications in 2013, the vast majority of the notifications that the RMV failed to process were for non-CDL drivers. RMV management was aware of this inaction, and in the fall of 2016 assigned processing of out-of-state paper notifications to another division—the MRB. For the next approximately year and a half, MRB and RMV management discussed approaches to process the ever-increasing accumulation of out-of-state paper notifications. When ATLAS became operational in March 2018, the MRB struggled to adapt to the new system. Because of this difficulty, the MRB was failing to complete its other task, processing in-state paper notifications, which prompted the RMV to instruct the MRB to focus on those. Therefore, at the time of the crash, the RMV had accumulated tens of thousands of unprocessed out-of-state paper notifications.

The RMV's failure to process notifications is a safety failure. By failing to process the information about infractions by Massachusetts-licensed drivers in other states, the RMV deprived itself of information necessary to identify particularly unsafe drivers.

Communication among the states about infractions and suspensions of nonresident driving privileges gives the license-issuing state knowledge about license-holders' full driving records. Connecticut took the necessary initial step of informing the license-issuing state about the suspension; Massachusetts failed to complete the next step and process the suspension. The NTSB concludes that due to systemic deficiencies in the Massachusetts RMV operations and inaction to rectify a known problem, the RMV failed to revoke the pickup truck driver's CDL as well as the licenses of many non-CDL Massachusetts drivers with infractions or suspensions in other states.

2.2.1.2 Postcrash Changes. After the crash, the RMV conducted an internal audit and an external review of its notification-processing procedures and its operations as a whole. The RMV processed the newly discovered electronic notifications and started processing tens of thousands of paper out-of-state notifications. The rapid processing of these paper notifications was imperfect; as discovered by the external reviewer, there were lapses in thoroughness and accuracy. As a result, the RMV started reprocessing the backlog of the paper out-of-state notifications. The initial reprocessing of the paper backlog resulted in the suspension of more than 5,000 Massachusetts drivers.[102]

By processing a years-long accumulation of out-of-state notifications, the RMV remediated a problem it had created. Although the postcrash remediation addressed the problems of the past (the previously received unprocessed notifications), the remaining deficiencies in Massachusetts RMV operations, if left uncorrected, would lead to the same problems arising again. To ensure consistent, timely, and thorough processing of future out-of-state notifications, RMV operations required transformation. Moreover, at the time of the crash, the RMV was not informing other states when drivers licensed in their jurisdictions committed infractions or had their driving privileges suspended in Massachusetts. To increase safety by sharing information about unsafe drivers licensed in other states, RMV policies also needed to be altered.

Largely as a result of the postcrash internal audit and the recommendations from the external review, the RMV instituted numerous changes to its operations, policies, and processes. The RMV created the Out-of-State Unit to be responsible for processing all out-of-state notifications (incoming and outgoing) for both CDL and non-CDL holders. The RMV also established processes for documenting the workflow of electronic and paper out-of-state notifications, including (1) assigning specific personnel to the tasks, and (2) requiring daily status reports to management.

Had these postcrash system improvements been in place at the Massachusetts RMV at the time of the crash, the RMV would have revoked the pickup truck driver's CDL at least 10 days

[102] (a) On September 16, 2019, the Massachusetts RMV reported that the agency had suspended 5,260 drivers since this crash, including 1,869 drivers following the check of the NDR. Some of these drivers were suspended due to violations after June 21, 2019. (b) In a July 31, 2020, email, the RMV chief compliance officer informed NTSB investigators that the RMV was completing the reprocessing of all paper notifications to ensure that all were processed correctly.

before the crash and notified him of the revocation.[103] However, we cannot predict how the driver would have reacted to the loss of his CDL— such as whether he would have stopped working at Westfield Transport or continued driving illegally with a suspended license. Even if Westfield Transport had checked the driver's records before his employment, the carrier might still have hired him, considering that it was already employing another driver with a suspended license. Still, by not processing the notifications from Connecticut and revoking his license, the RMV eliminated the possibility that the driver would stop driving for Westfield Transport because of a revoked license. The NTSB concludes that had the Massachusetts RMV had effective systems in place to promptly revoke driver's licenses based on out-of-state notifications, the pickup truck driver's license would have been revoked before the Randolph crash.

The RMV's inaction before the crash allowed thousands of non-CDL drivers to retain licenses that should have been revoked; that inaction was a safety failure. However, all the postcrash changes that the RMV instituted indicate a shift in the agency's approach to safety. The new operational and process changes establish accountability and oversight mechanisms. Still, considering that operational deficiencies have been widespread and longstanding, external oversight of the RMV's operations would ensure continued adherence to newly adopted safety mechanisms. The Massachusetts Department of Transportation, of which the RMV is a division, would be best equipped to evaluate the effectiveness of the postcrash changes that the RMV implemented, and to provide regular oversight to maintain the efficacy of those changes.

The NTSB concludes that postcrash system changes by the Massachusetts RMV represent progress toward addressing the substantial deficiencies in RMV operations that existed at the time of the crash. The NTSB further concludes that if the postcrash system changes by the Massachusetts RMV are maintained, they would reduce the likelihood of drivers with a history of impaired driving retaining a Massachusetts driver's license. Therefore, the NTSB recommends that the Massachusetts DOT develop appropriate metrics and establish a process to regularly evaluate the effectiveness of the RMV's processing of out-of-state notifications, both incoming and outgoing, for CDL and non-CDL holders.

2.2.2 Communication Between States

2.2.2.1 Mechanisms. Numerous mechanisms allow states to communicate with each other regarding driver's licenses and driving records. CDLs are governed by federal requirements, while states administer the requirements for non-CDL drivers. CDLIS is the interstate electronic communication mechanism that states use to communicate about CDL drivers. Various compacts, such as the driver license compact (DLC) and the nonresident violator compact (NRVC), are designed to share the driving records of non-CDL drivers.[104]

CDLIS is a nationwide electronic database established under the Commercial Motor Vehicle Safety Act of 1986 and based on 49 CFR 383–384. The centralized system enables states to electronically transmit information about traffic infractions and suspensions that a CDL driver

[103] Connecticut's suspension of nonresident driving privileges would have gone into effect on the conviction date—June 10, 2019.

[104] *Compacts* such as the DLC are agreements between states about exchanging drivers' information, for example, driver's license infractions or suspensions, and frequently include reciprocity regarding penalties for various traffic violations.

incurs, regardless of where the violations take place. The system also informs the CDL-issuing state whether its driver has an infraction in another state. CDLIS is maintained by AAMVA.

The FMCSA provides grants to states to help them comply with CDL program requirements, according to 49 CFR 383–384.[105] One requirement includes notification of disqualifications. However, the regulation does not specify a method of notification, such as electronic or paper, although it stipulates that an electronic notification must be sent through CDLIS. Indeed, some states use exclusively paper notifications to inform the licensing state about disqualifications.[106] The FMCSA also provides grants to AAMVA to maintain CDLIS. All 50 states and the District of Columbia participate in the program.

Compacts such as the DLC and the NRVC are designed not only to share the driving records of non-CDL drivers, but also to include agreements about reciprocity regarding license suspensions. In practice, the compacts allow a state to assess an administrative action (penalty) on a driver's license in the home state even when a violation occurs in a different state.

2.2.2.2 Other State Examples. Although existing mechanisms afford interstate communication about infractions and suspensions of CDLs or non-CDLs, as evident in this investigation, there are deficiencies. The effectiveness of these mechanisms depends on states' adherence, specifically, in notifying other states about violations committed by drivers licensed in those states, and processing notifications from other jurisdictions.

Although Massachusetts has taken steps to rectify the problems regarding out-of-state license suspensions that existed at the time of the crash, it is reasonable to expect that such problems exist in other states. In the aftermath of this crash, at least two of the states neighboring Massachusetts uncovered similar problems with processing out-of-state infractions and suspension notifications.

In October 2019, Rhode Island transportation officials reported that the state had found more than 22,500 infractions and suspensions of nonresident driving privileges committed in Rhode Island by Massachusetts-licensed drivers that had gone unreported to the RMV.[107] Following the discovery, Rhode Island started sending notifications about infractions and suspensions—which dated back to 2017—to the Massachusetts RMV.

In August 2019, the New Hampshire governor's office reported that the state had a decades-long backlog of unprocessed incoming notifications about infractions or license suspensions.[108] The office stated that by August 2019, the state had processed a backlog of 13,015 out-of-state notifications. At the end of the audit of unprocessed in- and out-of-state

[105] The grants are based on the CDL Program Implementation Grant.

[106] In an August 13, 2020, meeting with NTSB investigators, staff from the USDOT Office of Inspector General discussed the process of license-disqualification notification. The purpose of this meeting is further discussed in section 2.2.2.3.

[107] See https://www.bostonherald.com/2019/10/04/rhode-island-sending-22500-unreported-driving-violations-to-mass-rmv/, accessed October 26, 2020.

[108] See https://www.unionleader.com/news/crime/dmv-review-to-yield-more-than-driver-license-suspensions-in/article_b2647856-ded6-57e4-afc0-a4dca10d1ab2.html, accessed October 26, 2020.

notifications, the New Hampshire DMV suspended the licenses or nonresident driving privileges of 3,852 drivers, including suspensions for seven CDL drivers.

2.2.2.3 Mechanisms Under Review or Development. As discussed earlier, because of deficiencies in the RMV's implementation of ATLAS, the registry failed to process notifications about the infractions committed by the pickup truck driver and two other Massachusetts CDL drivers. In light of the problems uncovered in the RMV's internal review, the USDOT Office of Inspector General initiated an audit to assess the FMCSA's oversight of state driver's licensing agencies and their procedures for disqualifying commercial drivers when warranted.[109]

The greatest adverse consequence of the RMV's organizational deficiencies related to the processing of paper notifications, most of which affected non-CDL drivers. Although both Connecticut and Massachusetts are members of the NRVC, the sharing agreement did not function as intended. Connecticut informed the Massachusetts RMV of the driver's suspension of driving privileges, but Massachusetts failed to process the information. Regarding the neighboring states, Rhode Island and New Hampshire are members of both the DLC and the NRVC. Yet Rhode Island had not been informing other states of infractions committed by their drivers, and New Hampshire had not been processing notifications from other states.

One benefit of CDLIS—in addition to having a federal mandate—compared with various non-CDL compacts is that it provides a centralized electronic database of driver records. AAMVA is creating the Driver History Record, a centralized electronic database intended to function as a CDLIS for non-CDL driving records. The information from the Driver History Record is to be transmitted using the state-to-state (S2S) verification service. S2S is an electronic tool designed to assist states in determining if an applicant already holds a driver's license or identification card in another state. In that regard, S2S has the same purpose as CDLIS. Participation in S2S will be required for a state to be compliant with the REAL ID Act, passed by Congress in 2005.[110] As of October 2020, 50 states and three territories were compliant with minimum REAL ID requirements, and two territories are under review. The deadline for implementation of REAL ID is October 2021.

2.2.2.4 Statewide Recommendations. AAMVA's development of the Driver History Record should provide a centralized database of non-CDL driving records. However, until that occurs, an intermediate countermeasure is needed. Considering that at least two states neighboring Massachusetts also reported problems with incoming and outgoing out-of-state notifications of infractions and license suspensions, the NTSB is concerned that the problem exists nationwide. Other states, especially those without specific policies or oversight mechanisms regarding out-of-

[109] In an August 13, 2020, meeting with NTSB investigators, staff from the Office of Inspector General stated that it expected to complete its report by the end of 2020. The report is to include across-the-states data regarding the thoroughness, accuracy, and timeliness of processing out-of-state notifications of violations committed by CDL holders, and the role of the FMCSA in overseeing the process.

[110] The REAL ID Act, which is implemented by Department of Homeland Security "established minimum security standards for state-issued driver's licenses and identification cards, and it prohibits federal agencies from accepting licenses and identification cards from states that do not meet these standards for official purposes." The website also presents the list of 50 states and 5 territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and the US Virgin Islands) with the status of their compliance with REAL ID requirements.

state notifications, would benefit from examining their processes or conducting audits to uncover any unprocessed notifications.

The NTSB concludes that considering the problems uncovered in Massachusetts and neighboring states, the process for revoking the licenses of CDL and non-CDL drivers with disqualifying offenses could be greatly enhanced by improving interstate communication, including promptly sending notifications to other states and expeditiously processing incoming out-of-state notifications. Therefore, the NTSB recommends that 49 states—Massachusetts excepted—and the District of Columbia and the Commonwealth of Puerto Rico direct their state licensing agencies to review existing procedures or develop new ones to accurately and expeditiously (1) process notifications received from other states about infractions and suspensions committed by the home state's drivers in those jurisdictions, and (2) notify other jurisdictions of infractions and suspensions committed in the home state by drivers licensed in those jurisdictions.

2.3 Federal Oversight of Motor Carriers

This crash was preventable. Although this statement applies to nearly all crashes, the investigation identified significant weaknesses in the safety framework that supports safe operation of a motor carrier and its drivers. One of these framework weaknesses was the carrier: Westfield Transport was a particularly unsafe carrier. Westfield Transport had a myriad of safety deficiencies at the time of the crash, related both to the crash-involved driver and to other drivers, and also to the overall absence of basic safety policies that establish a safe carrier.

These carrier deficiencies also reflect on the FMCSA's ability to detect unsafe carriers and remove them from operating on public roadways. We examined different time periods of Westfield Transport's operation during which the FMCSA could have had the opportunity to detect the carrier's unsafe actions. In support of that analysis, we examined the carrier's operational safety during the new entrant period, and the ability of the FMCSA's new entrant safety assurance program to identify Westfield Transport as an unsafe carrier at that time or to predict the extent to which the carrier could become unsafe in the future (see section 2.3.2.1).

Next, we examined Westfield Transport's operational procedures and safety record after the carrier exited the new entrant program, and the ability of the FMCSA's oversight program to detect the extent of Westfield Transport's unsafe operation prior to this crash (see section 2.3.2.2). Our analysis also discusses FMCSA oversight of ELD providers, specifically KeepTruckin, whose ELDs the Westfield Transport staff easily manipulated to circumvent HOS requirements (see section 2.3.3).

Finally in this section of the analysis, we discuss how the FMCSA has the tools to remove—permanently or for an extended period—already identified unsafe carriers from operation (see section 2.3.4). However, the FMCSA's current implementation of IH orders is rare and inconsistent, particularly when coupled with limitations in detecting reincarnated carriers.

2.3.1 Westfield Transport Operation at the Time of the Crash

At the time of the crash, the carrier had three alerts in its BASICs—related to unsafe driving, HOS compliance, and driver fitness. However, the BASIC score was not sufficient to accurately characterize the extent of Westfield Transport's operational failures. Postcrash NTSB

and FMCSA examinations of Westfield Transport operations showed that the carrier was in severe noncompliance with federal motor carrier safety regulations. The FMCSA conducted a postcrash compliance review that resulted in 25 safety violations, 8 of which were acute or critical.

The NTSB views these safety violations not only as indicators of noncompliance with federal regulations, but also as safety metrics. Westfield Transport was negligent in even the most fundamental task a motor carrier is required to accomplish—ensuring that it employs properly qualified drivers. Regarding the crash-involved driver, Westfield Transport failed to (1) require him to fill out an application, (2) conduct a background check, and (3) review his safety performance and driving history.[111] Had Westfield Transport contacted the driver's previous employers and conducted a background check, the carrier would have learned that the driver had been (1) involved in three other crashes with disabling damage since 2012, (2) terminated from a previous driving job because of behavior indicating drug use, and (3) terminated from another carrier because he failed to comply with a postcrash drug test requirement. The NTSB therefore concludes that by failing to conduct an appropriate background check and safety history on the pickup truck driver, Westfield Transport exhibited a substantial disregard for federal motor carrier safety regulations, resulting in hiring and employing a driver with significant safety risks.

Proper investigation of drivers' background and safety histories is critical for assessing their risk to others. Another critical element, as well as an oversight mechanism, is drug testing, specifically preemployment and random screening. According to 49 CFR 382.301, a carrier is required to implement and maintain a drug testing program for any driver operating commercial motor vehicles that require a CDL. Although Westfield Transport had two such vehicles, the carrier lacked a preemployment and random drug-testing program.

The carrier also did not have a safety plan, written policies, or training for its drivers. In short, basic elements of a safety framework were absent. Further, Westfield Transport failed to maintain complete DQ files on its drivers. For example, for the entire duration of one driver's employment at Westfield Transport, he operated with a revoked CDL despite the carrier having documentation of the revocation. In another violation of safety regulations, the carrier owner, the manager, and the drivers routinely tampered with ELDs to falsify HOS logs; 28 of 150 randomly selected logs were falsified. The manager admitted lying to NTSB investigators and demonstrated how staff were able to conceal tampering with ELDs in order to falsify HOS logs.[112] The NTSB concludes that Westfield Transport's egregious noncompliance with federal motor carrier safety regulations and its actions to conceal its deceptive practices indicate a motor carrier without regard for safety.

2.3.2 Oversight of Westfield Transport Before the Crash

Considering that the postcrash investigation revealed Westfield Transport to be in severe noncompliance with federal regulations, it is reasonable to question how the carrier was allowed to operate. To answer this question, we examined the specific periods of Westfield Transport's

[111] See section 1.7.2 for relevant federal motor carrier safety regulations about maintaining driver qualification files (49 CFR 391.51) and inquiries into the prospective driver's safety performance history (49 CFR 391.23).

[112] See section 1.7.3 for the relevant federal motor carrier safety regulations regarding ELDs (49 CFR 395.15).

operation during which the FMCSA could have had opportunity to detect the carrier's unsafe actions before the crash.

2.3.2.1 Oversight During the New Entrant Period. When Westfield Transport obtained USDOT operational authority on July 8, 2016, the carrier entered the FMCSA's new entrant safety assurance program, which consists of an 18-month probationary period. As part of the program, Westfield Transport had to pass a safety audit that evaluates the adequacy of a carrier's basic safety management controls and is typically conducted within 3 months of entering the new entrant program. The safety audit consists of an in-person meeting with an inspector—an FMCSA investigator or a certified state inspector—during which the carrier reports the types of vehicles it uses, answers questions, and provides documentation (where applicable) to help the inspector determine the carrier's compliance in 17 different areas.[113]

The FMCSA conducted a safety audit of Westfield Transport on October 21, 2016. At that time, Westfield Transport operated with a single vehicle that had a GVWR below 26,001 pounds. Several of the questions in the safety audit pertained to the requirements of a drug-testing program; because the carrier did not have any vehicles that required a CDL for operation, those questions did not apply. The safety audit did not identify any violations, and Westfield Transport continued with the remainder of the 18-month new entrant probationary period, until January 2018.

According to information from roadside inspections, after passing the safety audit, the carrier added one more pickup truck and one more trailer.[114] During the new entrant probationary period—July 2016 to January 2018—Westfield Transport had seven roadside inspections that resulted in two OOS violations for its driver. Both occurred during a single roadside inspection on November 21, 2017. According to MCMIS, the violations resulted in the carrier having one BASIC in alert status—HOS compliance—on December 29, 2017. Westfield Transport had no other violations, and on January 9, 2018, the carrier successfully exited the new entrant safety assurance program. At that time, based on information from the roadside inspections, the carrier had two pickup trucks and two trailers.

More than 35,000 motor carriers enter the new entrant program each year.[115] Because of the high number of carriers and the FMCSA's limited resources, new carriers do not typically receive a CR during the new entrant program.[116] However, they are monitored, and under certain conditions a new entrant may be subject to an expedited action, including a CR.[117] Some of the conditions for an expedited action include using a driver without a valid CDL (if required),

[113] Some states use a small number of state troopers or DMV employees who are certified through the FMCSA Motor Carrier Safety Assurance Program (MCSAP) to conduct new entrant safety audits or compliance reviews of a carrier. Westfield Transport's safety audit is included as an attachment to the motor carrier factual report in the public docket for this investigation.

[114] The second pickup truck and the trailer also had a GVWR below 26,001 lbs.

[115] According to Motor Carrier Progress Reports (see the motor carrier factual report in the public docket for this investigation), the number of new entrant safety audits conducted during fiscal years 2015 and 2018 ranged between 35,893 and 39,919.

[116] As of the date of this report, the FMCSA employs 308 investigators who can conduct a CR. Additionally, through MCSAP, some states have certified a limited number of officers who can conduct CRs.

[117] According to 49 CFR 385.308, an expedited action is a response to actions identified by roadside inspections or other means and may result in an expedited safety audit, compliance review, or written response required by the carrier.

operating an OOS vehicle, or using a driver who has tested positive for a controlled substance or has refused to submit to alcohol or drug testing. Based on the FMCSA data, each year about a third of new entrant carriers have their operational authority revoked because they fail or do not show up for their safety audit, or have an expedited action against them during that year.[118] During its new entrant probationary period, Westfield Transport did not meet any of the seven conditions for an expedited action.

The NTSB concludes that although the FMCSA's new entrant safety assurance program functioned as designed and did not detect violations by Westfield Transport during the probationary period that merited an expedited action, the program—due to its inherent limitations—could not predict Westfield Transport's subsequent unsafe operation.

2.3.2.2 Oversight After the New Entrant Period. After a carrier successfully exits the new entrant safety assurance program, it enters the FMCSA general oversight of motor carriers. The FMCSA uses various metrics to evaluate carriers for an intervention (such as a CR). To aid in its evaluation, the FMCSA classifies carriers into risk categories: (1) high risk, (2) moderate risk, (3) risk, (4) warning letter, and (5) monitor categories.[119] Placement in one of the risk categories is based on the outcome of a roadside inspection and scores in BASIC. The US Congress mandates that carriers in the high-risk category receive a CR.[120] Freight carriers that are deemed high risk for 2 consecutive months are placed on a mandatory list and typically receive a CR within 3 months. Carriers in the moderate-risk category are not prioritized for a CR but typically receive one within 12 months of meeting the moderate-risk criteria; the time depends on the date of the last review and the BASIC scores. Application of planned CRs to carriers in other risk categories is dependent on FMCSA and state resources; only after a CR is conducted on all the high- and moderate-risk carriers may the lower-rated carriers receive a CR. However, carriers can also receive a CR after involvement in a crash, regardless of their risk rating.

After Westfield Transport exited the new entrant program, it had 48 roadside inspections before the Randolph crash, resulting in 23 OOS violations. The carrier therefore had three BASICs in alert status after February 2019—related to unsafe driving, HOS compliance, and driver fitness. Based on the defined criteria, Westfield Transport was not considered a high-risk carrier; the FMCSA classified Westfield Transport a moderate-risk carrier in February 2019.

The increase in the number of roadside inspections after Westfield Transport exited the new entrant program—48 inspections in the 1.5-year period after the new entrant program ended, compared with only seven roadside inspections during the 1.5-year new entrant probation period—was in part due to the increased number of vehicles that Westfield Transport used in its operation.

After the carrier exited the new entrant program, it started using more vehicles and hiring additional drivers. As shown in table 6, during the 13 months after Westfield Transport exited the

[118] For fiscal year 2018, 33 percent of new entrant carriers had OOS orders (refusal of audit/no contact, failure of safety audit, expedited actions). For fiscal year 2019, 36 percent of new entrant carriers had OOS orders. (Additional information is available in the motor carrier factual report—attachment titled Motor Carrier Progress Reports FMCSA—in the public docket for this investigation.)

[119] New entrant carriers are automatically placed in the *monitor* category after passing the safety audit. However, based on the roadside inspections, these carriers can also be classified differently.

[120] Mandated by the FAST Act (link here).

new entrant program, the carrier had 31 roadside inspections resulting in 15 OOS violations. During that time, Westfield Transport was alternating between having one and two BASIC alerts. Based on roadside inspection information, Westfield Transport used at least 11 different pickup trucks during this period; 3 vehicles were leased from (and shared with) another carrier.

As a result of the accumulated OOS violations, on February 4, 2019, the carrier accrued three BASIC alerts. At that time, the FMCSA classified Westfield Transport as a moderate-risk carrier and rated it as "red" on the inspection criteria.[121] The *red* rating indicates to roadside inspectors that the carrier's vehicles (along with its drivers) should always be inspected when encountered. This inspection rating resulted in an increased number of roadside inspections and even more OOS violations.

Table 6. Westfield Transport's history of operations.

Period/Date	Number of Vehicles [a]	Roadside Inspections	OOS Violations	BASIC Alerts
18 months (new entrant) Jul 8, 2016 – Jan 9, 2018	1 – 2	7	2	0 – 1 [b]
13 months (post-new entrant) Jan 9, 2018 – Feb 4, 2019	2 – 11	31	15	1 – 2 [c]
5 months (post-new entrant) Feb 4, 2019 – Jun 21, 2019	8	17	8	3

[a] The number of vehicles refers only to pickup trucks (not trailers) and is based on the information from roadside inspections (e.g., 11 different vehicles were inspected during the 13-month period) and the 8 vehicles that Westfield Transport owned at the time of the crash.

[b] The OOS violations occurred toward the end of the new entrant period, on November 21, 2017.

[c] The first time that Westfield Transport had two alerts in BASIC was on May 2, 2018.

2.3.2.3 Recommendation. Before the crash, Westfield Transport had not been subject to a CR, although the FMCSA's general process of monitoring carriers and assessing their safety risk was progressing toward identifying Westfield Transport as a carrier that merited closer scrutiny. Westfield Transport was categorized as a moderate-risk carrier less than 5 months before the crash. However, only through the postcrash CR did the FMCSA determine the extent of Westfield Transport's unsafe operation.

The FMCSA's task of overseeing more than half a million motor carriers is tremendous, which is why the agency relies on metrics to identify potentially high-risk carriers before applying the CR as the primary tool for making a definitive determination about a carrier's safety.[122] In support of this strategic application of resources, in 2013, the FMCSA implemented the new entrant safety assurance program, which allows the agency to provide a layer of oversight without conducting a CR. The new entrant program has had some success in identifying unsafe carriers. In

[121] The FMCSA and most state commercial motor vehicle enforcement agencies use Aspen, one of several software applications used in roadside inspections. The FMCSA can set inspection criteria or an alert in Aspen, which inspectors use to prioritize inspections.

[122] Based on FMCSA data, as of December 2018, there were 560,809 motor carriers in the United States.

fiscal year 2019, about a third of new entrant carriers had an expedited action against them or failed their safety audit.

However, as demonstrated in this investigation, a carrier's lack of even the most basic elements of a safety framework may not be detected during the new entrant program, particularly given the limited data from infrequent roadside inspections. Carriers' unsafe operation may be detectable only after they increase their operation and are subjected to more frequent roadside inspections. Increased data from more roadside inspections allowed the FMCSA to categorize Westfield Transport as a moderate-risk carrier in February 2019, but the process was too slow to prevent the Randolph crash.

In the FMCSA's current oversight system, a carrier that has just completed the new entrant program receives the same scrutiny as a carrier that has been operating for decades. However, a carrier that rapidly increases the number of vehicles in its operation immediately after exiting the new entrant program, dramatically accumulates violations from increased roadside inspections, and accrues two BASIC alerts 4 months later—as Westfield Transport did—may require a higher level of scrutiny. Such scrutiny could be expressed through adjusting the criteria for high-risk carriers or otherwise applying additional oversight to such carriers. The NTSB concludes that recent graduates of the FMCSA's new entrant safety assurance program that exhibit a dramatic increase in roadside inspections and subsequent violations demonstrate that the safety of their operation has been compromised. Therefore, the NTSB recommends that the FMCSA establish an additional layer of oversight of recent graduates of the FMCSA new entrant safety assurance program that has a lower tolerance for unsafe operations.

2.3.3 Oversight of ELD Providers

Westfield Transport management and drivers routinely falsified HOS logs and tampered with the fleet's KeepTruckin ELDs. Although the carrier and its drivers clearly violated safety regulations pertaining to disabling or tampering with ELDs, this investigation uncovered the ease with which the carrier was able to circumvent the ELD.[123] The manager described the tampering process to NTSB investigators. As an example, a few days before the crash, the owner was transporting cargo from Grand Rapids, Michigan, to West Springfield, Massachusetts, when he disconnected the ELD in the vehicle from his smartphone and tampered with the KeepTruckin phone application as he approached the maximum allowed HOS. That resulted in the logbook (a smartphone application) being frozen to the last duty station, enabling the owner to continue driving for an additional 6 hours while appearing to remain within the HOS. When the ELD reconnected, logs correctly recorded the vehicle's new location but did not flag the inconsistency between the new vehicle location and the travel time to reach it. Specifically, the log did not include a malfunction code for the location discrepancy, as required by regulations. Inspection of other Westfield Transport driver records showed similar HOS log falsifications. According to 49 CFR 395 subpart B, an ELD must record a malfunction/diagnostic code when the system—through self-monitoring—detects compliance failures, including those pertaining to vehicle location, system power, and timing, among others. No such fault codes were recorded by the Westfield Transport ELDs that NTSB investigators examined. A nonmanipulated ELD that meets

[123] Title 49 CFR 395.8(e)(2) prohibits disabling, tampering, or otherwise interfering with the operation of an ELD or an automatic onboard recording device (the previous name for an ELD).

the 49 CFR 395 subpart B requirements would have recorded a malfunction code, indicating a likely falsification.

The NTSB recently investigated another high-fatality crash—in Thoreau, New Mexico, on August 30, 2018—in which a motor carrier used KeepTruckin as a device provider to meet the HOS logging requirements.[124] That investigation, like the Randolph one, revealed that the driver of the involved combination vehicle had falsified the HOS logs.[125] The KeepTruckin device used by the driver in the Thoreau crash was an automatic onboard recording device (AOBRD), an ELD predecessor.[126] Although federal regulations pertaining to ELDs require more extensive recording of data and malfunction codes, the regulations pertaining to AOBRDs also require error codes to be recorded and that the devices be tamperproof.

NTSB investigators discovered that the truck driver in the Thoreau crash disconnected the AOBRD earlier that morning; the last log entry in the KeepTruckin phone application was recorded at 8:32 a.m. and showed the combination vehicle as located outside Holbrook, Arizona, 127 miles from the crash site. The logs did not include any diagnostic event codes or errors of malfunction that would indicate likely falsification. The investigators found similar indicators of KeepTruckin log falsification by this driver during the previous days, as well as by other drivers employed by the same carrier.[127]

As of November 2020, KeepTruckin was one of 629 ELDs approved by the FMCSA. These devices are registered with the FMCSA and self-certified to meet the federal requirements of 49 CFR 395 subpart B. One of the regulatory requirements is that the device "automatically captures date and time, vehicle position, and vehicle operational parameters" and that the "ELD must have the capability to monitor its compliance with the technical requirements in this section for the detectable malfunctions and data inconsistencies." Nevertheless, the KeepTruckin logging devices used by the motor carriers in both the Randolph and Thoreau crashes did not accurately record drivers' HOS or provide diagnostic or malfunction codes, indicating likely falsification. The NTSB therefore concludes that based on two recent NTSB investigations in which drivers were able to easily manipulate KeepTruckin logging devices to falsify HOS, these devices do not appear to be in compliance with federal regulations. Therefore, the NTSB recommends that the FMCSA remove KeepTruckin ELDs from the list of approved providers until the company has demonstrated compliance with federal regulations.

[124] The crash occurred at 12:20 p.m. local time, when a truck-tractor combination vehicle crossed the median of Interstate 40 as a result of a tire blowout, entered the opposite lanes of travel, and struck a motorcoach, killing eight of its occupants.

[125] For additional details about this investigation, see Motor Carrier Group Chairman Factual Report and associated attachments in the public docket for Thoreau, New Mexico, investigation (HWY18MH016).

[126] AOBRDs are electronic logging devices that were regulated under 49 CFR 395.15. The authority to use these devices ended in December 2017, but those already in use in commercial vehicles were allowed to be used until December 2019.

[127] By examining supporting documentation such as highway toll reports and fuel receipts, investigators also discovered that the crash-involved driver most likely violated HOS requirements on previous days, but that the AOBRD had not recorded any codes to indicate HOS violations or falsification. The investigation revealed similar HOS violations and failure of the logging recording device to meet the 49 CFR 395.15 requirements in other logs of this motor carrier's drivers.

Considering the high number of ELD providers and the ease with which the KeepTruckin ELD was tampered with, the NTSB is concerned that the problems related to ELD manipulation extend beyond a single provider. The FMCSA relies on the self-certification process to approve these devices, the process which is used throughout the transportation industry. NHTSA successfully uses self-certification to ensure the safety of all vehicles on public roads, but the agency also relies on other methods—such as occasional testing to crashworthiness performance standards—for verifying vehicle manufacturers' compliance with safety regulations. Similar random testing of ELD providers by the FMCSA could be an effective tool for verifying the performance standards of these devices. But the FMCSA could also regularly review roadside inspection data for indicators of falsification or ELD tampering, in order to conduct targeted evaluation of ELD providers. As such, the NTSB recommends that the FMCSA review and revise the certification process by which the agency approves ELD providers to ensure that products meet federal regulations.

2.3.4 Postcrash Oversight and Imminent Hazard Orders

As discussed in section 2.3.2, an additional layer of oversight would be a proactive mechanism for detecting unsafe carriers who are recent graduates of the new entrant program. The FMCSA also has reactive mechanisms, such as IH orders, that can remove an already detected unsafe carrier from operation. In this section of the analysis, we (1) examine the FMCSA's decision not to issue an IH order to Westfield Transport postcrash, (2) discuss the FMCSA's general implementation of IH orders as a reactive oversight mechanism, and (3) explore possible proactive applications of IH orders.

The postcrash compliance review that the FMCSA conducted resulted in an "unsatisfactory" rating for Westfield Transport. The FMCSA investigator who conducted the compliance review initiated a process to issue an IH order on the carrier based on the overall number of safety violations, including eight acute and critical violations, the "unsatisfactory" safety rating, and the seven fatalities that resulted from this crash. However, the determination whether to issue an IH order can also include more subjective considerations. The FMCSA determined that Westfield Transport's operation and its impact on the circumstances of the crash did not constitute an imminent hazard, and therefore the agency did not issue the order. Specifically, in its response to the NTSB's inquiry about the Randolph crash, the FMCSA stated ". . . none of the violations discovered impacted the June 21, 2019 crash."

The NTSB identified multiple failures in Westfield Transport's operation that allowed the driver to operate the pickup truck at the time of the crash. The FMCSA postcrash CR identified the same failures, including (1) failing to investigate drivers' background and drug/alcohol history, (2) failing to provide training in reasonable suspicion testing to designated staff, (3) making or permitting drivers to give a false report of duty status, and (4) requiring drivers to work more hours than regulations allow. Some of those safety violations directly contributed to the primary causal factor of this crash—the pickup truck driver's unsafe driving performance, likely due to impairment. The HOS violations affected the location where the driver would have ended his duty and the cargo load he would have been assigned.

Although roadside inspections and BASIC scores are useful metrics for gaining insight into the safety of a carrier's operation, a full CR gives a more complete picture of whether a carrier has the necessary safety framework in place. In that regard, an IH order is a reactive tool because it is

implemented only *after* a carrier is detected operating in an unsafe manner. Such a carrier can operate in an extremely unsafe way for a prolonged time before being detected by the FMCSA.

An IH order can also have a proactive application—it can prevent a carrier from reincarnating by banning its owners, managers, and drivers from being employed by other carriers and preventing its vehicles from being registered by another carrier. The NTSB's investigation uncovered 21 carriers that have commonalities or affiliations with Westfield Transport; 13 of them have current operating authority and 3 have had their operating authority revoked due to failure to comply with safety audits. The owner of Westfield Transport also owned East Transport, but that company went out of business on August 9, 2019, after the FMCSA attempted to conduct a new entrant safety audit. DAKS Express—which was associated with the crash-involved driver—still had operating authority as of the date of this report. East2West Transport—which listed a former Westfield Transport driver as its manager and also employed as a driver the person who worked at Westfield Transport with a suspended license—also still had operating authority. Such commonalities are typical of reincarnated carriers and such organizational structure may allow an unsafe carrier to easily reincarnate into another. Without an IH order, an operator can continue its unsafe practices under a different name as a new carrier. The NTSB concludes that by deciding not to issue an IH order against Westfield Transport, the FMCSA missed an opportunity to improve safety by preventing the carrier's owner, manager, and drivers from continuing their unsafe practices, possibly with the same vehicles, by reincarnating into other carriers.

The method by which the FMCSA issues IH orders lacks consistency. In 2017, the FMCSA issued several IH orders against carriers based on the same violations that the FMCSA uncovered during the postcrash CR of Westfield Transport.[128] For example, in an IH order issued against the carrier J & L Trucking in April 2017, the FMCSA noted the carrier's failure to (1) ensure that its vehicles were regularly inspected and maintained (the carrier lacked documentation of repairs), (2) monitor drivers' HOS (the carrier did not require drivers to keep a logbook), and (3) comply with certain DQ requirements.

The FMCSA's application of IH orders is also sparse, particularly in recent years (see table 7). From 2000 until 2008, the FMCSA issued IH orders only to passenger- and hazardous-material motor carriers, and between 2000 and 2008, only 14 orders total were issued. For the next 6 years—2009 through 2014—the frequency of IH orders increased substantially; the FMCSA issued 112.[129] During the subsequent 6-year period—2015 through 2020—the FMCSA issued only 17. In the 2 years preceding this report, the FMCSA issued no IH orders to motor carriers, and only two for individual drivers.

[128] For additional details on IH orders for Keep on Trucking, Even Flo Logistics, and J & L Trucking, see the attachment titled Examples of IH Orders in the motor carrier factual report in the public docket for this investigation.

[129] Although the FMCSA may issue IH orders to motor carriers or individual drivers, the numbers in table 7 show IH orders to motor carriers only.

Table 7. Frequency and type of IH orders between 2000 and 2020.

	Year												
	2000 – 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
IH Order	14 [a]	9	2	15	43	32	11	6	7	3	1	0	0 [b]

[a] Only passenger- and hazardous-material motor carriers were issued IH orders during 2000–2008. The orders in the subsequent years were issued to all types of carriers, including freight.

[a] Indicates the number of IH orders through fiscal year 2020.

The NTSB views IH orders as an effective tool for removing unsafe carriers from participating in commerce, which is why the agency has argued for their broader use. Following a January 2014 crash in Naperville, Illinois, in which contributing factors were inadequate FMCSA oversight and the crash-involved motor carrier's failure to ensure that its drivers adhered to HOS requirements, the NTSB issued a recommendation to the FMCSA pertaining to IH orders (NTSB 2016):

> Review the process and procedures for imminent hazard orders to identify ways in which this process can be improved to work more swiftly and effectively; when implementing the improvements, seek legislative authority for such changes as necessary. (H-16-1)

In its responses—the last of which was received in August 2018—the FMCSA stated that the agency was continuing to develop rulemaking to improve the IH review process. As a result, the NTSB classified Safety Recommendation H-16-1 "Open—Acceptable Response."

The NTSB recognizes the challenges related to issuing IH orders, particularly those associated with relying on court proceedings and establishing the burden of proof. These challenges were exhibited in the aftermath of the Naperville crash—the FMCSA issued an IH order on the carrier, but a USDOT administrative judge overturned it. These setbacks might explain the FMCSA's reluctance to issue an IH order in the Randolph crash. One of the primary goals of Safety Recommendation H-16-1 was to empower the FMCSA, by seeking legislative authority, to complete its mission—keeping interstate commerce safe. With respect to the Randolph crash, the safety benefits of an IH order go beyond Westfield Transport, which has since gone out of business. When an IH order is executed on a carrier, all its drivers, vehicles, and essential personnel are listed in the order and classified as OOS—they are also prohibited from working for other motor carriers. This is a critical element of an IH order, as it helps prevent the carrier from reincarnating into another carrier to avoid the OOS order.

The NTSB concludes that the FMCSA inconsistently applies IH orders, which can be an effective tool for removing unsafe motor carriers from service and preventing owners, managers, and drivers from continuing their unsafe practices, frequently with the same vehicles, by reincarnating into other carriers.

Based on the FMCSA's lack of progress toward completing its rulemaking to improve the IH review process and the fact that the agency has not sought legislative authority to enact the

changes as recommended, the NTSB reiterates Safety Recommendation H-16-1 to the FMCSA. The NTSB also classifies Safety Recommendation H-16-1 "Open—Unacceptable Response."

2.4 Motorcycle Rider Safety

2.4.1 Motorcycle Antilock Braking Systems

2.4.1.1 ABS in this Crash. Four of the motorcycles involved in this crash were equipped with ABS—those in positions 2, 9, 12, and 13. As defined by FMVSS 122, ABS "senses wheel slip and automatically modulates the pressure producing the braking forces at the wheel(s) to limit the degree of wheel slip." The purpose of ABS on motorcycles is the same as on other vehicles—to maximize braking force. ABS technology on motorcycles allows riders to maximize braking force to bring the motorcycle to a controlled stop without locking up its wheels, thereby improving stability.

The rider of the motorcycle in position 2 was traveling immediately behind the lead motorcycle, but on the right side of the staggered formation. Although being on the right side placed the motorcycle out of the direct path of the combination vehicle, the impact with the lead motorcycle created a potentially hazardous situation, to which this rider responded by braking. ABS on this motorcycle likely helped the rider maintain stability while bringing the motorcycle to a stop in a grassy area off the right shoulder; based on the vehicle inspection and the postcrash interview with the rider, the position 2 motorcycle came to rest upright.

The rider of the motorcycle in position 9 was traveling on the left side of the staggered formation. Based on the crash reconstruction, roadway evidence, and a postcrash interview, had this rider not slowed down substantially, she would likely had struck the pickup truck or the trailer. The rider maintained stability while emergency braking; the motorcycle remained upright until near where it came to rest. The minor motorcycle damage and the lack of scraping on the roadway and on the motorcycle indicate that the motorcycle fell over where the rider came to a near stop. Having an ABS-equipped motorcycle likely helped this rider maintain stability while emergency braking; however, ABS does not provide stability or balance when not braking and when traveling at very low speeds.

The rider of the motorcycle in position 13 was traveling on the left side of the formation, but investigators were unable to determine on which side the motorcycle in position 12 traveled. Although the two motorcycles were most likely not in the path of the pickup truck or its trailer, the impacts with the motorcycles ahead caused the riders to respond by braking and swerving.[130] Having ABS-equipped motorcycles likely helped these riders maintain stability while emergency braking; both motorcycles came to rest upright. The NTSB concludes that the ABS on four of the motorcycles likely aided those riders in performing emergency braking during the crash sequence.

2.4.1.2 General Benefits of ABS in Motorcycles. Compared with four-wheel vehicles, motorcycles inherently have reduced stability, particularly at low speeds or during wheel lock-up. In a recent safety report about risk factors associated with the causes of motorcycle crashes, the

[130] The responses by these riders are based on crash reconstruction, roadway evidence, and postcrash interviews. For example, the rider and passenger of motorcycle 13 reported having to swerve to avoid striking the motorcycle in position 9.

NTSB examined a crash database from a Federal Highway Administration study and analyzed the effect of several critical risk factors on motorcycle crashes (NTSB 2018; FHWA 2016). One of the factors was the rate of crashes involving ABS-equipped motorcycles; motorcycles without ABS were associated with a 109 percent increased crash risk relative to ABS-equipped motorcycles.

The benefits of ABS, specifically in improving stopping performance, have been shown in numerous closed-track studies and are applicable to both novice and experienced riders (Vavryn and Winkelbauer 2004; Green 2006). Other studies examined the potential benefits of ABS in real-world crashes. Depending on the study, 17 to 50 percent of crashes in which another vehicle violated the motorcyclist's path could have been avoided had the motorcycles been equipped with ABS (Gwehenberger and others 2006; Rizzi, Strandroth, and Tingvall 2009).

In 2013, the Insurance Institute for Highway Safety (IIHS) conducted an extensive study examining the fatal crash rate of ABS-equipped motorcycles and comparing them to the rates of the same motorcycle models without ABS (IIHS 2013). Based on crash data from the Fatality Analysis Reporting System and the criteria for eligible motorcycles—registration years between 2003 and 2011 and with ABS as an option—ABS-equipped motorcycles were associated with a 31 percent reduction in fatal motorcycle crashes.

Although NHTSA has developed a standard for ABS on motorcycles—FMVSS 122—the systems are not required equipment on motorcycles. However, if a manufacturer equips a motorcycle with ABS, the system has to meet FMVSS 122 specifications. In comparison, ABS has been required equipment on passenger vehicles since 2000.[131] Of the approximately 7.2 million registered on-road motorcycles in the United States in 2018, only 12.3 percent of them had ABS as standard equipment (IIHS 2019). According to NHTSA, the prevalence of ABS as standard equipment was 50 percent on 2018 models and 60 percent on 2019 models.[132] Although the availability of ABS on new motorcycles is increasing, the abundant research showing the benefits of the technology strongly indicates that ABS should be standard equipment on all new motorcycles.

The NTSB previously reached that conclusion in the 2018 safety report discussed earlier. In the report, we recommended that NHTSA:

> Require all new motorcycles manufactured for on-road use in the United States be equipped with antilock braking system technology. (H-18-32)

In response, NHTSA stated that the agency continues to evaluate data, but has not yet been able to conclusively determine the effectiveness of ABS to reduce motorcycle crashes and injuries. The NTSB disagreed and classified Safety Recommendation H-18-32 "Open—Unacceptable Response," stating the following:

> We note your ongoing efforts to evaluate precrash scenarios for crash avoidance research; however, it is well understood that ABS technology on motorcycles

[131] FMVSS 135, *Light Vehicle Brake Systems*, established ABS safety standards for passenger cars manufactured on or after September 1, 2000.

[132] According to IIHS, 60.5 percent of model 2019 motorcycles had ABS as standard equipment.

> provides a safety benefit across numerous crash scenarios by allowing the rider to maximize braking force and performance, which in turn improves motorcycle stability and control. For more than a decade, there has been a strong and consistent body of research demonstrating the empirical safety benefits of ABS on motorcycles for both novice and experienced riders. We do not believe that further research is necessary to confirm the benefits of ABS technology on motorcycles. We urge you to move forward expeditiously with the recommended requirement.

NHTSA stated that it has "recently completed a comprehensive analysis of crashes involving motorcycles with a focus on understanding the specific pre-crash scenarios that might be addressed by crash avoidance technologies." The agency recently published a report about this analysis, but the report does not contain any information about the effectiveness of ABS on motorcycles (NHTSA 2020c). The sole mention of ABS comes in the context of crash scenarios that might not be prevented by vehicle-to-motorcycle communication technology but that could be prevented or mitigated by other technologies, such as antilock braking.

Many studies have shown that ABS-equipped motorcycles are associated with a reduced crash risk. The lifesaving technology has been required equipment on passenger vehicles for two decades in the United States, and has been required equipment on motorcycles in Europe since 2016.[133] In emergency situations, ABS is a crucial component that can help motorcycle riders avoid a crash. The NTSB concludes that because ABS can aid motorcycle riders when braking in emergency situations, broad deployment of the technology would reduce the crash risk for motorcycle riders. Therefore, the NTSB reiterates Safety Recommendation H-18-32 to NHTSA.

2.4.2 Helmet Use

Although ABS can help a motorcycle rider avoid a crash, when a crash does occur, the main occupant protection available to a rider is their protective gear. Because it protects the head, a helmet is the most important component of that protective gear. In this crash, we ascertained helmet use for 14 of the 18 motorcyclists; 12 riders and passengers were wearing a USDOT-compliant helmet, but two were not.[134] Of the seven motorcyclists who died in this crash, three were wearing USDOT-compliant helmets, one was likely not wearing a helmet, and the helmet use for the remaining three motorcyclists is unknown. The rider leading the formation and the first to be struck by the combination vehicle was likely not wearing a helmet; he died of blunt-force head trauma.

In September 2006, the NTSB held a 2-day public forum on motorcycle safety (NTSB Report to Congress 2006).[135] In the decade before the forum, motorcycle fatalities increased dramatically. According to crash statistics, 4,837 motorcyclists died in 2006, a 129 percent increase over motorcyclist fatalities in 1997 (NHTSA 2008).[136] The NTSB's Motorcycle Safety Forum addressed multiple initiatives and safety countermeasures to reduce the likelihood of motorcycle crashes and fatalities, including vehicle design, motorcycle protective equipment, rider

[133] The European Union requirement came into effect on January 1, 2016, and applies to all motorcycles with an engine displacement over 125 cubic centimeters.

[134] The helmet use of three riders and one passenger is unknown. See appendix C for details.

[135] See https://www.ntsb.gov/about/Documents/SPC0701.pdf, accessed August 17, 2020.

[136] In 1997, 2,116 motorcyclists died in crashes.

impairment, training, licensing, and education. As a result of the public forum, the NTSB issued several safety recommendations, including three recommendations for state and territorial governments with partial or no helmet laws to adopt a universal helmet law requiring all motorcycle riders and passengers (no matter what age) to use an FMVSS 218-compliant helmet when motorcycling. One recommendation was issued to the states without any helmet laws, including New Hampshire:[137]

> Require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-38)

Because of a lack of progress on implementing this recommendation, H-07-38 issued to New Hampshire remains classified "Open—Unacceptable Response." The intent of the other two recommendations was the same, with an additional consideration for existing laws. The recommendations were issued to states/commonwealths and territories with partial motorcycle helmet laws (H-07-39) and to those where laws do not specifically require the use of FMVSS 218-compliant helmet (H-07-40):

> Amend current laws to require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-39)

> Amend current laws to specify that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-40)

Because of a lack of progress on implementing these two recommendations, they remain classified "Open—Unacceptable Response."[138]

Meanwhile, the high rate of annual motorcycle fatalities since the issuance of the 2007 recommendations has persisted; 4,985 motorcyclists died in 2018 (NHTSA 2019b). Considering that helmets are 37 percent effective in preventing rider fatalities—41 percent effective for passengers—the rate of motorcycle fatalities could be considerably reduced with widespread use of USDOT-compliant helmets (NHTSA 2005). An analysis that NHTSA conducted on motorcycle fatalities in 2017 placed this helmet effectiveness rate in a perspective of saved lives (NHTSA 2019a). According to the analysis, USDOT-compliant helmets saved 1,872 lives in 2017, but another 749 lives could have been saved that year had the riders and passengers involved in fatal

[137] Safety Recommendation H-07-38 was issued to three states: Illinois, Iowa, and New Hampshire. The status of H-07-38 for Illinois and Iowa is "Open—Unacceptable Response."

[138] Safety Recommendation H-07-39 was issued to 27 states/commonwealths and one territory. The status of this recommendation is "Open―Acceptable Response" for the one territory (Guam); and all 27 states have an "Open―Unacceptable Response" status.

Safety Recommendation H-07-40 was originally issued to eight states/commonwealths, the District of Columbia, and four territories. The status of the recommendation is "Closed―Reconsidered" for one territory and one state; "Closed―Unacceptable Action" for one territory; and the District of Columbia and the remaining seven states/commonwealths and two territories have an "Open―Unacceptable Response" status.

crashes worn helmets. Furthermore, had all the motorcyclists worn a helmet, an additional $8.9 billion in comprehensive costs could have been saved in 2017.[139]

Helmets can save lives, but only when motorcyclists use them. The average national rate of use of USDOT-compliant helmets was 71 percent in 2019 (NHTSA 2020b). In states with mandatory universal helmet-use laws, the helmet use rate was 89 percent, compared to a 56 percent usage rate in states with partial or no mandatory helmet-use laws.[140] The result of the discrepancy in state laws regarding helmet use requirements is best demonstrated in the percentage of fatally injured motorcyclists who did not wear helmets at the time of a crash; in 2017, 57 percent of fatally injured motorcyclists in states without universal helmet-use laws were not helmeted, compared with 8 percent of fatally injured motorcyclists in states with universal helmet-use laws (NHTSA 2020a).

In this crash, the speed, mass, and direction of travel of the oncoming combination vehicle created a challenging environment for motorcyclists' protective gear to save lives. Six motorcycles—carrying six riders and two passengers—were directly struck by the pickup truck or its trailer during the crash sequence; only one of the riders survived, with serious injuries. The NTSB concludes that although the effectiveness of helmet use in this crash for each motorcyclist could not be conclusively determined, USDOT-compliant helmets have been shown to provide the best protection for motorcyclists when a crash occurs, and state universal helmet-use laws increase the use of USDOT-compliant helmets in those states. Therefore, the NTSB reiterates Safety Recommendations H-07-38 through -40.

2.4.3 Alcohol Impairment and Motorcycle Spacing

The rider of the motorcycle leading the formation had a BAC of 0.135. Three other riders had BACs ranging from 0.06 to 0.07. Although alcohol-impaired operation considerably increases the crash risk for operators of all types of roadway vehicles, motorcycle riders are at a particular risk. A quarter of all motorcycle rider fatalities in 2016 had a BAC greater than 0.08 (NCSA 2018). Motorcycle riders also exhibit performance deficits at lower BACs; research conducted on a closed track shows that motorcycle riders' response time to a potential hazard increases even with a BAC of 0.05 (Creaser and others 2007).

An unimpaired, fully alert rider has improved perception and reaction abilities and is more capable of controlling a motorcycle. Although the roadway evidence in this crash indicates that the combination vehicle crossed the centerline at a shallow angle, the evidence provides no indication of how long the vehicle was straddling the centerline before crossing—several seconds or less than a second. If the crash had developed rapidly—the combination vehicle straddled the centerline momentarily before crossing—even an attentive and unimpaired rider would have had little time to react to the encroachment by the combination vehicle. The NTSB concludes that although the lead rider was impaired by alcohol, the extent to which his impairment impeded his ability to execute an evasive maneuver could not be determined.

[139] Comprehensive costs include the economic costs (such as medical, property damage, legal, lost productivity) with the additional valuation for lost quality of life.

[140] Currently, 18 states and the District of Columbia have universal helmet-use laws, requiring helmets for all riders; 29 states have partial laws that typically only cover motorcyclists younger than 18; three states have no helmet-use laws. See the IIHS website for more information.

After the first impact, the combination vehicle traveled 95 feet before striking the last motorcycle in the sequence (position 11 in the formation). Assuming a combination vehicle speed of 50 mph—based only on the speed limit, given no available recorded data—the sequence of impacts ended rapidly, within 1.3 seconds.[141] The *State of New Hampshire Motorcycle Operator Manual* provides instructions for riding in a staggered formation.[142] The manual states that riders on the same side of a formation—left or right—should maintain a 2-second following distance behind each other, or about 140 feet if traveling at the posted speed limit. Considering that the motorcycles had entered US-2 just moments before the crash—about 1,100 feet west of the site of the first impact—and that the staggered formation was still developing, combined with the lack of recorded speed data, the analysis was unable to determine the precise spacing between motorcycles. Despite those limitations, the 95-foot distance that the combination vehicle traveled between hitting the lead motorcycle and hitting the 11th motorcycle in the formation indicates that the spacing between the motorcycles was very tight. After the first impact, the riders behind the lead motorcycle had very limited time and space for executing evasive maneuvers.

The NTSB concludes that although alcohol impairment increases a motorcycle rider's response time to a potential hazard, the rapid progression of impacts in this crash along with the tight spacing made it unlikely for most riders behind the lead motorcycle to be able to avoid the oncoming pickup truck.

The result of the crash was catastrophic. Although the NTSB could not conclusively determine the extent to which rider actions affected the crash outcome, the circumstances could inform and remind other motorcyclists about the importance of safe riding. Therefore, the NTSB recommends that the National Association of State Motorcycle Safety Administrators and the Motorcycle Safety Foundation inform their members about this crash and remind them about the safety benefits of wearing USDOT-compliant helmets, safe spacing when riding in groups, riding unimpaired, and ABS-equipped motorcycles.

[141] The estimate of 1.3 seconds (traveling 95 feet at a speed of 50 mph) assumes no appreciable loss in speed from the multiple impacts with the motorcycles or from braking.

[142] The manual is developed by the Motorcycle Safety Foundation.

3 Conclusions

3.1 Findings

1. None of the following were factors in the crash: (1) driving experience of the pickup truck driver and motorcycle riders; (2) cell-phone distraction by the pickup truck driver; (3) mechanical condition of the combination vehicle and the motorcycles; (4) highway design; and (5) weather conditions.

2. The emergency response to the crash was timely and appropriate.

3. The pickup truck driver's crossing of the centerline occurred because of his impairment from use of multiple drugs.

4. Due to systemic deficiencies in the Massachusetts Registry of Motor Vehicles (RMV) operations and inaction to rectify a known problem, the RMV failed to revoke the pickup truck driver's commercial driver's license (CDL) as well as the licenses of many non-CDL Massachusetts drivers with infractions or suspensions in other states.

5. Had the Massachusetts Registry of Motor Vehicles had effective systems in place to promptly revoke driver's licenses based on out-of-state notifications, the pickup truck driver's license would have been revoked before the Randolph crash.

6. Postcrash system changes by the Massachusetts Registry of Motor Vehicles (RMV) represent progress toward addressing the substantial deficiencies in RMV operations that existed at the time of the crash.

7. If the postcrash system changes by the Massachusetts Registry of Motor Vehicles are maintained, they would reduce the likelihood of drivers with a history of impaired driving retaining a Massachusetts driver's license.

8. Considering the problems uncovered in Massachusetts and neighboring states, the process for revoking the licenses of commercial driver's license (CDL) and non-CDL drivers with disqualifying offenses could be greatly enhanced by improving interstate communication, including promptly sending notifications to other states and expeditiously processing incoming out-of-state notifications.

9. By failing to conduct an appropriate background check and safety history on the pickup truck driver, Westfield Transport exhibited a substantial disregard for federal motor carrier safety regulations, resulting in hiring and employing a driver with significant safety risks.

10. Westfield Transport's egregious noncompliance with federal motor carrier safety regulations and its actions to conceal its deceptive practices indicate a motor carrier without regard for safety.

11. Although the Federal Motor Carrier Safety Administration's new entrant safety assurance program functioned as designed and did not detect violations by Westfield Transport during the probationary period that merited an expedited action, the program—due to its inherent limitations—could not predict Westfield Transport's subsequent unsafe operation.

12. Recent graduates of the Federal Motor Carrier Safety Administration's new entrant safety assurance program that exhibit a dramatic increase in roadside inspections and subsequent violations demonstrate that the safety of their operation has been compromised.

13. Based on two recent National Transportation Safety Board investigations in which drivers were able to easily manipulate KeepTruckin logging devices to falsify hours of service, these devices do not appear to be in compliance with federal regulations.

14. By deciding not to issue an imminent hazard order against Westfield Transport, the Federal Motor Carrier Safety Administration missed an opportunity to improve safety by preventing the carrier's owner, manager, and drivers from continuing their unsafe practices, possibly with the same vehicles, by reincarnating into other carriers.

15. The Federal Motor Carrier Safety Administration inconsistently applies imminent hazard orders, which can be an effective tool for removing unsafe motor carriers from service and preventing owners, managers, and drivers from continuing their unsafe practices, frequently with the same vehicles, by reincarnating into other carriers.

16. The antilock braking systems on four of the motorcycles likely aided those riders in performing emergency braking during the crash sequence.

17. Because antilock braking systems can aid motorcycle riders when braking in emergency situations, broad deployment of the technology would reduce the crash risk for motorcycle riders.

18. Although the effectiveness of helmet use in this crash for each motorcyclist could not be conclusively determined, US Department of Transportation (USDOT)-compliant helmets have been shown to provide the best protection for motorcyclists when a crash occurs, and state universal helmet-use laws increase the use of USDOT-compliant helmets in those states.

19. Although the lead rider was impaired by alcohol, the extent to which his impairment impeded his ability to execute an evasive maneuver could not be determined.

20. Although alcohol impairment increases a motorcycle rider's response time to a potential hazard, the rapid progression of impacts in this crash along with the tight spacing made it unlikely for most riders behind the lead motorcycle to be able to avoid the oncoming pickup truck.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of the Randolph, New Hampshire, crash was the pickup truck driver's crossing the centerline and encroaching into the oncoming lane of travel, which occurred because of his impairment from use of multiple drugs. Contributing to the crash was Westfield Transport's substantial disregard for and egregious noncompliance with safety regulations. Also contributing was the failure of the Massachusetts Registry of Motor Vehicles to revoke the pickup truck driver's Massachusetts driver's license when notified of his loss of driving privileges in another state.

4 Recommendations

4.1 New Recommendations

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

To the Federal Motor Carrier Safety Administration:

Establish an additional layer of oversight of recent graduates of your new entrant safety assurance program that has a lower tolerance for unsafe operations. (H-20-34)

Remove KeepTruckin electronic logging devices from the list of approved providers until the company has demonstrated compliance with federal regulations. (H-20-35)

Review and revise the certification process by which your agency approves electronic logging device providers to ensure that products meet federal regulations. (H-20-36)

To the Massachusetts Department of Transportation:

Develop appropriate metrics and establish a process to regularly evaluate the effectiveness of the Registry of Motor Vehicles' processing of out-of-state notifications, both incoming and outgoing, for commercial driver's license (CDL) and non-CDL holders. (H-20-37)

To 49 states—Massachusetts excepted—and the District of Columbia and the Commonwealth of Puerto Rico:

Direct your state licensing agencies to review existing procedures or develop new ones to accurately and expeditiously (1) process notifications received from other states about infractions and suspensions committed by the home state's drivers in those jurisdictions, and (2) notify other jurisdictions of infractions and suspensions committed in the home state by drivers licensed in those jurisdictions. (H-20-38)

To the National Association of State Motorcycle Safety Administrators and the Motorcycle Safety Foundation:

Inform your members about this crash and remind them about the safety benefits of wearing US Department of Transportation-compliant helmets, safe spacing when riding in groups, riding unimpaired, and antilock braking system-equipped motorcycles. (H-20-39)

4.2 Previously Issued Recommendation Reiterated in this Report

The National Transportation Safety Board also reiterates the following safety recommendations:

To the National Highway Traffic Safety Administration:

> Require all new motorcycles manufactured for on-road use in the United States be equipped with antilock braking system technology. (H-18-32)
>
> This recommendation is reiterated in section 2.4.1 of this report.

To the three states with no motorcycle helmet laws (Illinois, Iowa, and New Hampshire):

> Require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-38)
>
> This recommendation is reiterated in section 2.4.2 of this report.

To the 27 states/commonwealths and one territory with partial motorcycle helmet laws (Alaska, Arizona, Arkansas, Colorado, Connecticut, Delaware, Florida, Hawaii, Idaho, Indiana, Kansas, Maine, Minnesota, Montana, New Mexico, North Dakota, Ohio, Oklahoma, Rhode Island, South Carolina, South Dakota, Texas, Utah, Wisconsin, and Wyoming; the commonwealths of Kentucky and Pennsylvania; and the territory of Guam):

> Amend current laws to require that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-39)
>
> This recommendation is reiterated in section 2.4.2 of this report.

To the seven states/commonwealths, the District of Columbia, and two territories with universal motorcycle helmet laws/regulations not specifically requiring FMVSS 218-compliant helmets (Alabama, Maryland, Michigan, Mississippi, Nevada, and West Virginia; the commonwealth of Virginia; the District of Columbia; and the territories of Northern Mariana Islands and the Virgin Islands of the United States):

> Amend current laws to specify that all persons shall wear a Department of Transportation Federal Motor Vehicle Safety Standard 218-compliant motorcycle helmet while riding (operating), or as a passenger on any motorcycle. (H-07-40)
>
> This recommendation is reiterated in section 2.4.2 of this report.

4.3 Previously Issued Recommendation Reiterated and Classified in this Report

The National Transportation Safety Board also reiterates and classifies the following safety recommendation:

To the Federal Motor Carrier Safety Administration:

> Review the process and procedures for imminent hazard orders to identify ways in which this process can be improved to work more swiftly and effectively; when implementing the improvements, seek legislative authority for such changes as necessary. (H-16-1)

This recommendation is reiterated and classified "Open—Unacceptable Response" in section 2.3.4 of this report.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

ROBERT L. SUMWALT, III
Chairman

JENNIFER HOMENDY
Member

BRUCE LANDSBERG
Vice Chairman

MICHAEL E. GRAHAM
Member

THOMAS B. CHAPMAN
Member

Report Date: December 1, 2020

Appendix A: Investigation

The National Transportation Safety Board received notification of the Randolph crash on June 21, 2019, and launched investigators from the Office of Highway Safety to address highway, survival and vehicle factors, motor carrier operations, and human performance. The Board also launched staff from its Media Relations and Transportation Disaster Assistance divisions.

The New Hampshire State Police, the Federal Motor Carrier Safety Administration, and the US Department of Transportation Office of Inspector General were parties to the investigation.

Appendix B: Consolidated Recommendation Information

Title 49 *United States Code* (USC) 1117(b) requires the following information on the recommendations in this report.

> For each recommendation—
>
> (1) a brief summary of the NTSB's collection and analysis of the specific accident investigation information most relevant to the recommendation;
>
> (2) a description of the NTSB's use of external information, including studies, reports, and experts, other than the findings of a specific accident investigation, if any were used to inform or support the recommendation, including a brief summary of the specific safety benefits and other effects identified by each study, report, or expert; and
>
> (3) a brief summary of any examples of actions taken by regulated entities before the publication of the safety recommendation, to the extent such actions are known to the Board, that were consistent with the recommendation.

To the Federal Motor Carrier Safety Administration

H-20-34

> Establish an additional layer of oversight of recent graduates of your new entrant safety assurance program that has lower tolerance for unsafe operations.

Information that addresses the requirements of 49 USC 1117(b), as applicable, can be found in sections 1.7.4 Federal Oversight, and 2.3.2 Oversight of Westfield Transport Before the Crash. Information supporting (b)(1) can be found on pages 21–26 and 45–49; (b)(2) and (b)(3) are not applicable.

H-20-35

> Remove KeepTruckin ELDs from the list of approved providers until the company has demonstrated compliance with federal regulations.

Information that addresses the requirements of 49 USC 1117(b), as applicable, can be found in sections 1.7.3 Hours of Service and Sleeping Berth, and 2.3.3 Oversight of ELD Providers. Information supporting (b)(1) can be found on pages 22–23 and 49–51; (b)(2) and (b)(3) are not applicable.

H-20-36

Review and revise the certification process by which your agency approves electronic logging device providers to ensure that products meet federal regulations.

Information that addresses the requirements of 49 USC 1117(b), as applicable, can be found in section 2.3.3 Oversight of ELD Providers. Information supporting (b)(1) can be found on pages 49–51; (b)(2) and (b)(3) are not applicable.

To the Massachusetts Department of Transportation

H-20-37

Develop appropriate metrics and establish a process to regularly evaluate the effectiveness of the Registry of Motor Vehicles' processing of out-of-state notifications, both incoming and outgoing, for commercial driver's license (CDL) and non-CDL holders.

Information that addresses the requirements of 49 USC 1117(b), as applicable can be found in sections 1.8 Interstate Communication about License Suspensions and 2.2.1 Massachusetts RMV Operations. Information supporting (b)(1) can be found on pages 28–34 and 39–44; information supporting (b)(2) can be found in section 1.8.5 External Postcrash Examination of RMV Operations on pages 31–34; (b)(3) is not applicable.

To 49 states—Massachusetts excepted—and the District of Columbia and the Commonwealth of Puerto Rico

H-20-38

Direct your state licensing agencies to review existing procedures or develop new ones to accurately and expeditiously (1) process notifications received from other states about infractions and suspensions committed by the home state's drivers in those jurisdictions, and (2) notify other jurisdictions of infractions and suspensions committed in the home state by drivers licensed in those jurisdictions.

Information that addresses the requirements of 49 USC 1117(b), as applicable can be found in 1.8 Interstate Communication about License Suspensions, and 2.2.2 Communication Between States. Information supporting (b)(1) can be found on pages 28–34 and 41–44; information supporting (b)(2) can be found on pages 33–34; information supporting (b)(3) can be found on pages 41–44.

To the National Association of State Motorcycle Safety and the Motorcycle Safety Foundation

H-20-39

Inform your members about this crash and remind them about the safety benefits of wearing US Department of Transportation-compliant helmets, safe spacing when riding in groups, riding unimpaired, and antilock braking system-equipped motorcycles.

Information that addresses the requirements of 49 USC 1117(b), as applicable can be found in sections 1.2.1 Injuries, 1.6.2 Motorcycle Riders, 2.4.2 Helmet Use, and 2.4.3 Alcohol Impairment and Motorcycle Spacing. Information supporting (b)(1) can be found on pages 2–4, 18, 56–58, and 58–60; (b)(2) and (b)(3) are not applicable.

Appendix C: Motorcycle Rider and Passenger Information

Model (if ABS equipped)	Age, Gender and Helmet Use	Occupant Injuries	Formation Position
1998 Harley Davidson Electric Glide	59; male; no helmet [a]	Fatal	1
2019 Harley Davidson Road Glide Special (ABS)	R: 48, male; USDOT-compliant helmet P: 47, female; USDOT-compliant helmet	R: None P: None	2
2006 Harley Davidson Heritage Softail	45, male; USDOT-compliant helmet	Serious	3
2007 Harley Davidson CVO Road King 3	51, male; USDOT-compliant helmet	Minor	4
2012 Harley Davidson CVO Ultra Classic Electra Glide	58, male; unknown helmet use	Fatal	5
2006 Harley Davidson Road Glide	R: 70, male; USDOT-compliant helmet P: 69, female; USDOT-compliant helmet	R: Minor P: Minor	6
2012 Harley Davidson Electra Glide Ultra Unlimited	57, male; USDOT-compliant helmet	Minor	7
2005 Harley Davidson Electra Glide Ultra Classic	62, male; USDOT-compliant helmet	Fatal	8
2015 Harley Davidson Softail Deluxe (ABS)	52, female; non-USDOT-compliant helmet	Minor	9
2012 Harley Davidson Electra Glide Ultra Limited	R: 45, male; unknown helmet use P: 42, female; unknown helmet use	R: Fatal P: Fatal	10
2007 Harley Davidson Electra Glide Ultra Classic	R: 58, male; USDOT-compliant helmet P: 58, female; USDOT-compliant helmet	R: Fatal P: Fatal	11
2019 Harley Davidson Street Glide (ABS)	53, male; unknown helmet use	None	12
2015 Harley Davidson - Electra Glide Ultra Limited Shrine (ABS)	R: 46, male; USDOT-compliant helmet P: 48, female; USDOT-compliant helmet	R: None P: Minor	13

[a] Based on the statement by one of the surviving riders and the nature of the injuries of the rider leading the formation, the lead rider was most likely not wearing a helmet.

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