September 16, 2025 HIR-25-06

Cargo Tank Combination Vehicle Roadway Departure, Rollover, and Release of Anhydrous Ammonia

Teutopolis, Illinois
September 29, 2023

On September 29, 2023, about 8:41 p.m. central daylight time, a minivan began passing a truck-tractor cargo tank combination vehicle (combination vehicle) carrying anhydrous ammonia while traveling west on two-lane United States Highway 40 (US-40) near Teutopolis, Effingham County, Illinois.[1] As the minivan, operated by a 17-year-old driver, was still in the process of passing, in the no passing zone, an oncoming vehicle approached. To accommodate the passing minivan and prevent a head-on collision in the opposite lane, the combination vehicle driver steered right. The combination vehicle departed the roadway, entered a drainage channel, overturned, rolled onto its right side, and slid forward until the front of the cargo tank struck a utility trailer parked in a residential yard. The collision with the trailer punctured the cargo tank, causing the release of anhydrous ammonia. The release caused five fatalities among nearby residents and vehicle occupants, serious injuries to nine, and minor injuries to four.

[1] (a) All times in this report are central daylight time. (b) Visit ntsb.gov for additional information in the public docket for this NTSB investigation (case no. HWY23MH017). Use the CAROL Query to search safety recommendations and investigations. (c) *Anhydrous ammonia* describes the ammonia that does not contain water.

Figure 1. Aerial view of the crash location with an inset showing the combination vehicle's final rest position.

Location	US Highway 40, between mile markers 21 and 22, Teutopolis, Illinois (see figure 2)
Date	September 29, 2023
Time	8:41 p.m. central daylight time
Involved vehicles	1 (the combination vehicle was the only one involved in the roadway departure, rollover, and release of anhydrous ammonia)
Involved people	The combination vehicle driver, 16 bystanders, and 1 first responder
Injuries	Combination vehicle driver: serious. Bystanders: 5 fatal (3 residents of a house at the crash location and 2 drivers of nearby vehicles), 8 serious (occupants of nearby vehicles), and 3 minor (2 occupants of nearby vehicles and 1 resident of a house within the area of the anhydrous ammonia plume) First responders: 1 minor
Weather	Dry, clear, and nighttime
Roadway information	Rural, unlit, undivided highway with one westbound and one eastbound travel lane; straight with a horizontal curve, asphalt concrete pavement, narrow shoulders; 55-mph speed limit

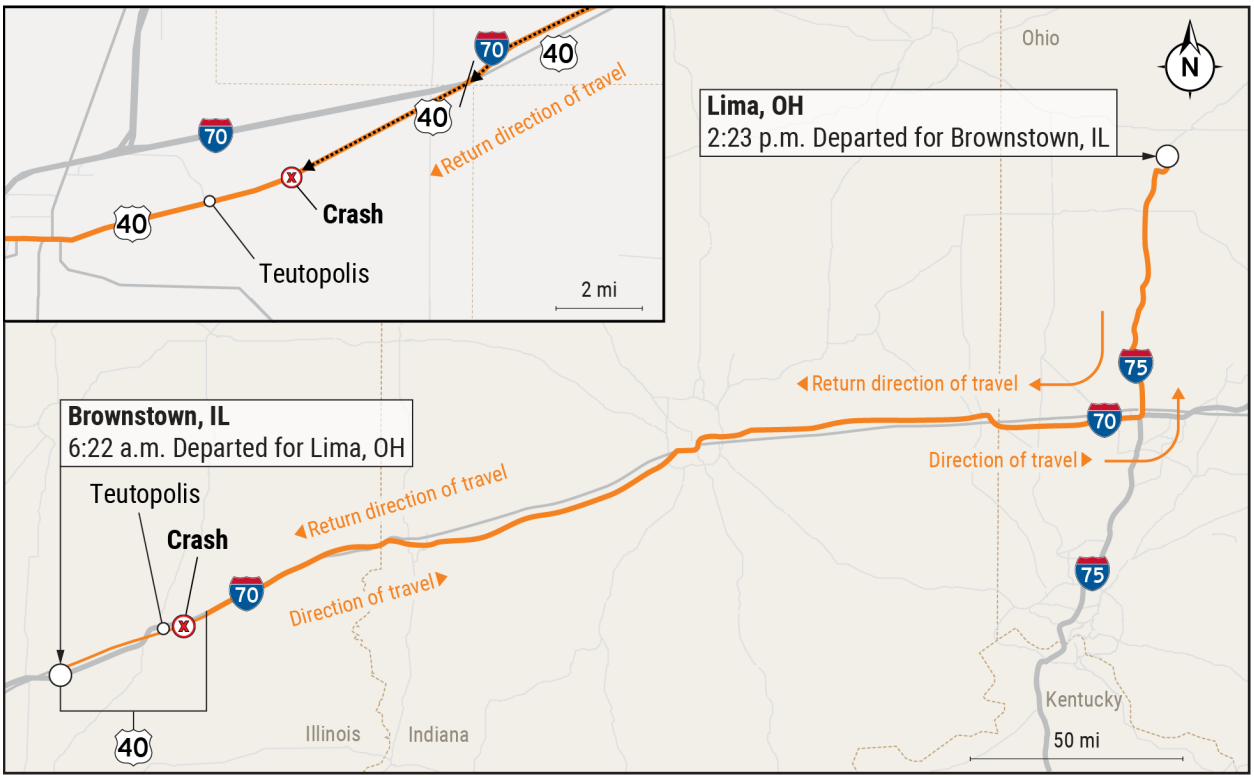

Figure 2. Map showing the combination vehicle route and the location of the crash.

1.1 Background

The combination vehicle, consisting of a 2005 International 9900ix truck-tractor pulling a 1978 Mississippi Tank Company MC331 cargo tank semitrailer, was operated by Prairieland Transport. The 24-year-old driver of the combination vehicle was completing a round trip that began around 6:30 a.m. in Brownstown, Illinois. The trip involved picking up anhydrous ammonia—a poisonous and corrosive liquefied gas—in Lima, Ohio, and returning to the carrier facility in Brownstown. The crash occurred when the driver was about 35 miles from the carrier facility. Section 1.5.1 discusses the effects of anhydrous ammonia, its classification as hazardous material (hazmat), and transportation requirements.

In the crash area, US-40 was a two-lane undivided highway with 12-foot-wide travel lanes. The westbound lane had a 1-foot-wide paved shoulder and a 2.7-foot-wide crushed aggregate shoulder with no rumble strips.[2] Beyond the aggregate shoulder was a grassy drainage channel about 1.9 feet deep.[3] The specific location where the combination vehicle departed the right side of the roadway was within a no passing zone for westbound traffic.

A driveway off the right side of the westbound lane provided access to a field to the north. Beneath the driveway, a 12-inch-diameter corrugated metal pipe culvert connected the east and west sides of the drainage channel (see figure 3). A residential house was located about 200 feet west of this driveway. A 2021 Sure-Tac utility trailer was parked near the house, positioned about 27 feet north of the westbound lane shoulder and 105 feet west of the west end of the culvert.

[2] These roadway measurements are averages over the 1,200 feet of roadway that was surveyed.

[3] According to standards from the American Association of State Highway and Transportation Officials, the slopes of the drainage channel were considered recoverable (defined as a slope on which most motorists can generally stop their vehicles or slow them enough to safely return to the roadway); however, those standards are based on passenger vehicles and do not consider the unique handling characteristics of larger vehicles such as commercial motor vehicles.

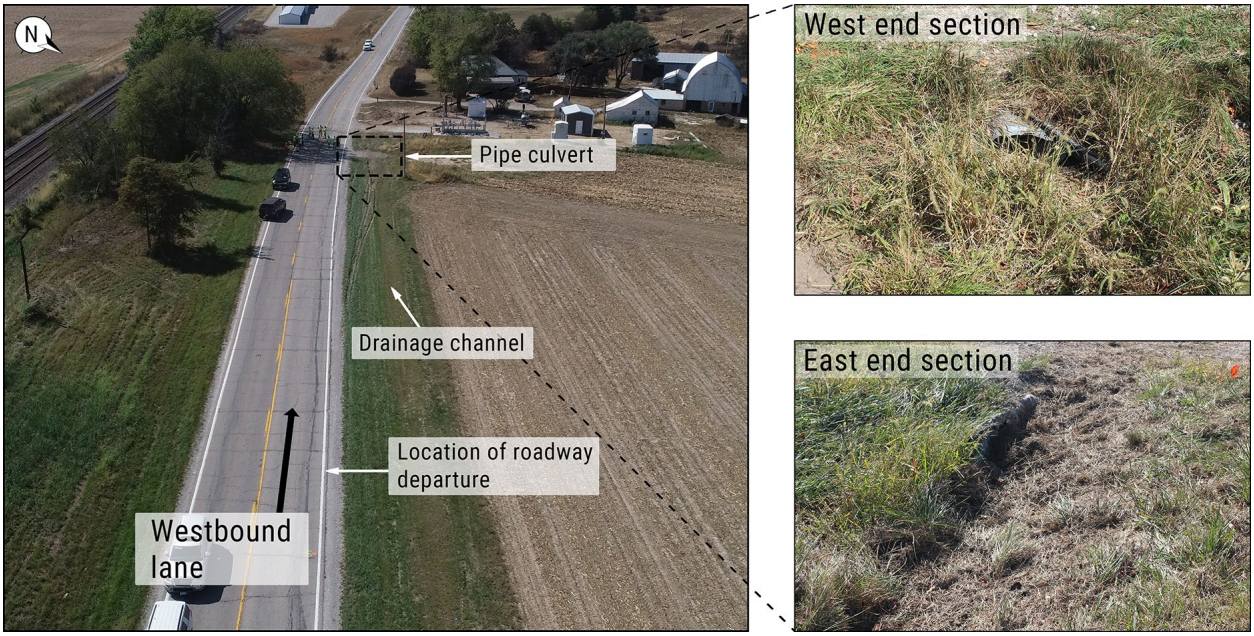

Figure 3. Aerial view of the crash location, with insets showing the east end (the one struck by the combination vehicle) and the west end of the pipe culvert.

1.2 Event Sequence

The sequence of events that culminated in the crash began between mile markers 21 and 22, when a 2013 Toyota Sienna minivan, occupied by a 17-year-old driver and two adult passengers, initiated a passing maneuver of the combination vehicle. The initial crash sequence was captured by a forward-facing camera on the combination vehicle.[4] The video footage captured about 50 seconds of precrash events; overlaid on the video were the vehicle speed and posted speed limit. The combination vehicle was shown traveling in the center of the westbound lane at speeds of 59 to 61 mph for the first 45 seconds. Between 31 and 40 seconds into the video, the headlights of an oncoming vehicle became visible several times before disappearing and reemerging due to the curvature of the roadway and environmental obstructions such as trees and farm buildings.

Forty seconds into the video (see figure 4), the footage showed a no passing zone sign located on the left shoulder (indicating the beginning of the no passing zone for the westbound traffic). At that time, the headlights of an oncoming vehicle were clearly visible and approaching.

Five seconds later, the footage showed the combination vehicle gradually moving toward the right shoulder. Two seconds later, the footage showed the combination vehicle had crossed onto the shoulder at 56 mph, as the minivan

[4] Imaging of the combination vehicle's electronic control module showed three recorded events, but none were associated with the crash.

emerged from the left, passed in front of the combination vehicle, and narrowly missed the oncoming commercial vehicle in the eastbound lane.

In the next 3 seconds of footage, the minivan continued west in the westbound lane while the combination vehicle continued off the roadway and into the drainage channel and began to overturn.

Figure 4. Screenshots of video footage from the combination vehicle's forward-facing camera showing: (1) the vehicle entering the no passing zone; (2) beginning of rightward steering 5.6 seconds later; (3) minivan front end visible in the oncoming lane 1.9 seconds later; (4) minivan emerging in front of the combination vehicle 0.3 seconds later; and (5) minivan reentering westbound lane 0.3 seconds later. (Source: Samsara, the fleet management system provider; screenshots resized by NTSB)

Physical evidence indicated that the cargo tank had overturned about 45 degrees (against the far side of the drainage channel embankment) before the truck-tractor had started to roll. The video footage ended just before the vehicle struck the culvert.

The front right of the truck-tractor struck the culvert, resulting in a counterclockwise yaw as the cargo tank continued to overturn; the impact caused the combination vehicle to jackknife.

As the combination vehicle continued westbound, the cargo tank overturned an additional 45 degrees as the front of the truck-tractor rotated rearward toward the rear of the cargo tank. The combination vehicle rolled onto its right side, with the cargo tank beginning to move in front of the truck-tractor. During this movement, the head of the cargo tank struck the parked utility trailer (see figure 5). Specifically, the cargo tank struck the trailer's tongue and lunette ring, which punctured the cargo tank head in an area of a weld seam, creating a hole measuring about 7 inches by 4 inches, resulting in the release of anhydrous ammonia (see figure 6).[5] The combination vehicle came to rest at the initial location of the utility trailer. The utility trailer was propelled westward about 31 feet. The pressurized anhydrous ammonia was released as a gas, and its plume started moving in a west-northwest direction.

About 529 feet before the combination vehicle departed the travel lane, a no passing zone for westbound vehicles began, extending westward beyond the location of roadway departure; the transition to a no passing zone was indicated by a 4-inch-wide solid yellow centerline stripe for westbound traffic and a no passing zone sign on the left shoulder. This no passing zone was preceded by a passing zone of about 0.65 miles.[6] The investigation could not determine whether the minivan driver initiated the passing maneuver in the passing zone or the no passing zone. Regardless of where the passing maneuver began, passing in a no passing zone is prohibited.[7]

[5] The *tongue* is a section of a trailer that extends forward from the frame, on which a coupler is attached for connection to a tow vehicle's hitch. A *lunette ring* is a sturdy, circular ring mounted at the forward end of a trailer tongue that interfaces with a pintle hitch on a tow vehicle to complete the connection for towing.

[6] Although the passing sight distance at the crash location (about 1,125 feet) was greater than the minimum recommended passing sight distance in the *Manual on Uniform Traffic Control Devices for Streets and Highways* for roadways with 55-mph speed limits, the Illinois Department of Transportation (IDOT) used a more conservative metric, requiring greater sight distances for passing zones.

[7] See Illinois law 625 ILCS 5/11-707.

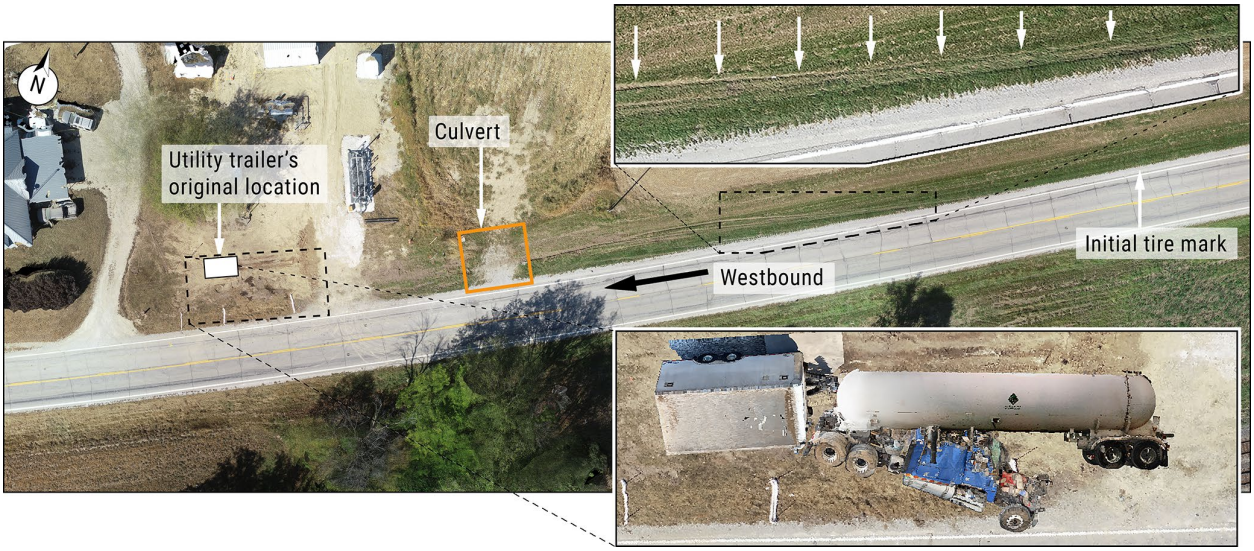

Figure 5. Orthomosaic overhead image of the crash area showing roadway evidence of roadway departure (detailed in upper inset) and the reconstructed orientation of the utility trailer and the combination vehicle at impact (lower inset). (Source: Illinois State Police; impact reconstruction and annotations by NTSB)

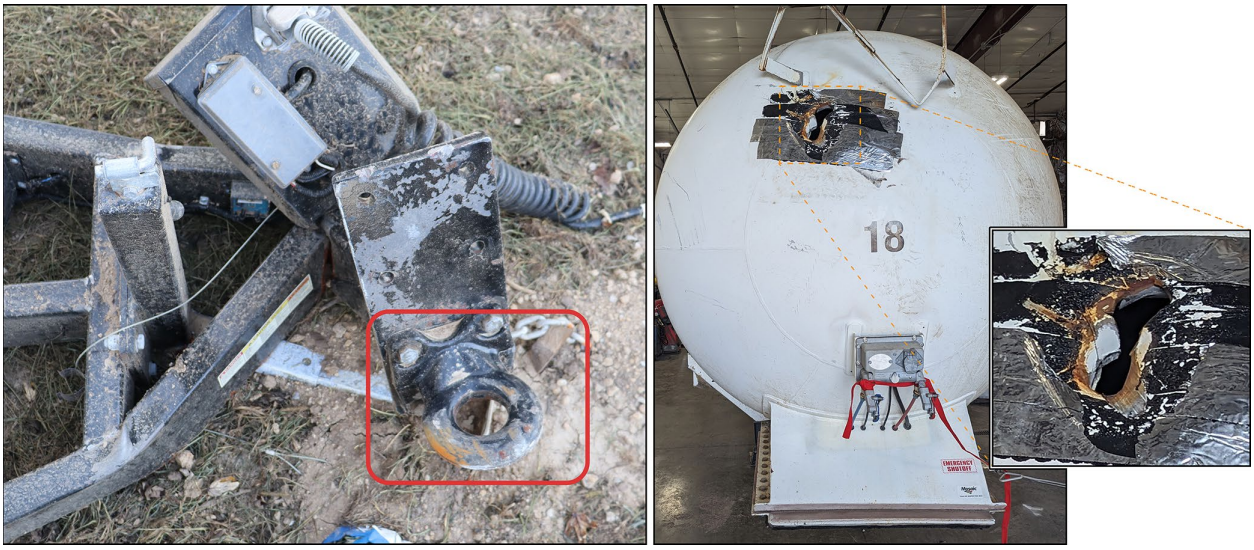

Figure 6. Images of the tongue and lunette ring (left, highlighted in red) and the punctured cargo tank head (right).

1.3 Injuries and Exposure to Anhydrous Ammonia

Nearly all fatalities and injuries were due to anhydrous ammonia exposure. Figure 7 shows the area where most affected vehicle occupants and home residents were located. The five fatally injured people all sustained chemical burns to their skin, eyes, and mouth and hemorrhaging in the respiratory system as a result of exposure to anhydrous ammonia.

The fatally injured people included:

- Three residents of the house in the driveway of which the cargo tank released anhydrous ammonia: an adult male and his two young children. The adult was found by first responders behind his house, lying on the ground, and the two children were found in the back seat of a parked vehicle in front of the house.
- Driver of a 2015 Kenworth truck-tractor combination vehicle. The vehicle approached the crash location from the east and was found parked in the drainage channel off the right shoulder, approximately 275 feet west from the overturned cargo tank. First responders found the driver lying in the drainage channel next to his vehicle.
- Driver of a 2023 Hyundai. The vehicle approached the crash location from the west and was found stopped after striking the fence of the residential house. First responders found the driver lying on the ground near his vehicle.

The combination vehicle driver and eight occupants of nearby vehicles were seriously injured. The combination vehicle driver self-extricated from the truck-tractor and walked east, away from the plume. Occupants of other vehicles approached the crash location and the anhydrous ammonia plume from the east or west and were found in their vehicles parked on the roadway, on the shoulders, or in a drainage channel, or they had driven through the area. Based on their medical records, all sustained severe anhydrous ammonia exposure injuries.

In addition to his injuries from anhydrous ammonia exposure, the combination vehicle driver also sustained minor injuries related to the crash and vehicle overturn. In the postcrash interview with the NTSB, the driver reported being restrained by a lap/shoulder belt at the time of the crash, and a postcrash examination of the seat belt webbing showed evidence of loading.

The other eight seriously injured people included:

- Four occupants of a 2019 Volkswagen
- Passenger of the 2023 Hyundai
- Driver of a 2022 Freightliner combination vehicle. It was found parked on the eastbound lane of US-40, west of the cargo tank final rest position (not captured in figure 7)
- Two occupants of a vehicle traveling east on US-40 through the area of the crash (not captured in figure 7).

Four people sustained minor injuries: two occupants of nearby vehicles, one resident of a house in the general area, and one first responder. Other than the first responder, whose injury was the result of anhydrous ammonia splashing on the ground and up the pant leg making direct contact with his skin, all minor injuries were due to anhydrous ammonia exposure. The minivan did not make contact with any

vehicles, and the driver and two passengers did not sustain any injuries and were not exposed to the anhydrous ammonia.

Figure 7. Aerial view of the crash area, showing the final resting positions of the combination vehicle and utility trailer, and several vehicles whose occupants suffered fatal and serious injuries.

1.4 Hazmat Emergency Response

The Effingham County Sheriff's Office dispatchers received the first notification of the crash at 8:43 p.m. through a 911 call from a passenger in the 2019 Volkswagen. They immediately dispatched Teutopolis Fire Protection District (TFPD). The combination vehicle driver, who reached a motorist after self-extrication, informed the 911 operator through the motorist, who had already called 911, that the substance was anhydrous ammonia. As the TFPD assistant chief approached the crash area 9 minutes later, he detected a pungent odor and promptly recognized it as ammonia, immediately instructing all first responders to retreat and not approach the scene. The TFPD assistant chief, who assumed the role of incident commander (IC), returned to Teutopolis and initially established staging at the intersection of St.

Francis Township Road and US-40, about 1.3 miles west of the scene. About 8:55 p.m., both eastbound and westbound approaches to the crash scene on US-40 were ordered closed; both directions were closed by 9:06 p.m. At 9:16 p.m., the IC sent a request for Mutual Aid Box Alarm System (MABAS), Illinois' mutual aid response system.[8]

Due to the westward movement of the anhydrous ammonia plume, the IC moved the staging area and incident command post several times, eventually establishing them at Teutopolis High School about 9:30 p.m. At that time, the IC formed a unified command post that evolved to include the Illinois State Police (ISP), Effingham County Sheriff's Office, and RuralMed EMS.

The Montrose Fire Department, in coordination with the IC, established a secondary staging and triage area about a quarter mile east of the crash site. About 9:00 p.m., hazmat-trained firefighters from Montrose and Teutopolis fire departments began entering the affected area ("hot zone") from the west and east to search for and evacuate people. In the next 2 hours, five critically injured patients were transported to area hospitals (four by medevac and one by ground). Shortly after 11:00 p.m., the occupants of the 2019 Volkswagen were located and moved to a triage area before being transported to area hospitals. In total, four patients were removed from the scene by medevac to area hospitals, two drove themselves to a hospital, and the rest were transported from the scene to area hospitals by ground.

At 11:17 p.m., a MABAS hazmat division (Division 26) consisting of specially trained personnel from multiple fire departments entered the hot zone for the first time with the goal of applying a patch to the puncture on the cargo tank that was still releasing anhydrous ammonia, as well as searching the immediate area for victims. The team's application of the patch had slowed down the release of anhydrous ammonia but had not completely stopped it.

Division 26 was led by the fire chief of the Charleston Fire Department. The division members donned turnout gear and self-contained breathing apparatus (SCBA).[9] The *Emergency Response Guidebook* (ERG) recommends that Level A personal protective equipment (PPE) be used when responding to anhydrous

[8] MABAS was established in partnership with the Illinois Emergency Management Agency and is intended to provide mutual aid response for fire, EMS, and specialized incident operational teams. Among other specialized teams, MABAS offers 40 hazmat teams.

[9] (a) *Turnout gear* refers to standard firefighting protective clothing. (b) The Charleston Fire Chief described the MABAS team members as donning Level C personal protective equipment (PPE), turnout gear, and SCBA, although the interviewed MABAS team members specified only turnout gear and SCBA. (c) Level C PPE consists of (1) full-face air-purifying respirators; (2) inner and outer chemical-resistant gloves; (3) hard hat; (4) escape mask; and (5) disposable chemical-resistant outer boots.

ammonia.[10] While Level A PPE was available for the hazmat team members, the team leader stated that considering there was no large anhydrous ammonia plume at that time, the team remained in their turnout gear with SCBA. The hazmat team members used the same gear in the subsequent entries to the hot zone; they never donned Level A PPE.

At 10:01 a.m. the following morning, members of the hazmat team—wearing turnout gear with SCBA—entered the hot zone for the fifth time to remove the patch in order to release pressure believed to be building up in the tank. During this process, the released anhydrous ammonia splashed onto the turnout pants of one hazmat member from Charleston Fire Department, causing minor injuries. While all members had the required certification (Hazmat Technician Level), none had specific anhydrous ammonia training.

Two decontamination stations were located on the western side of the crash site. Patients who were moved to the west side triage area were decontaminated properly. However, while first responders attempted to decontaminate patients moved to the east side triage area, they lacked decontamination stations there. As a result, patients from the east side were transported to hospitals with clothing still saturated with anhydrous ammonia, risking the spread of hazardous substances in transport vehicles and emergency departments.

At a request initiated by the Illinois Environmental Protection Agency, the IC worked with Response Management Services to remove the remaining anhydrous ammonia from the breached cargo tank.[11] Between 3:30 p.m. and 5:30 p.m., the RMS hazmat team transferred the remaining product into an empty cargo tank provided by Prairieland Transport and re-patched the puncture.

The hazmat operation was completed at 8:20 p.m., nearly 24 hours after the crash, at which time US-40 was reopened in both directions. More than 30 service agencies responded to this incident, including 27 local and county agencies.

In the postcrash interview with the NTSB, the IC stated that he did not refer to the ERG but immediately identified the hazard due to his experience. The chief of the Charleston Fire Department, who led the hazmat team, along with another member of the team, stated that they consulted the ERG en route to the incident site to help assess the necessary evacuation zones and isolation distances. None called the

[10] (a) The ERG, developed by the Pipeline and Hazardous Materials Safety Administration, is designed to help first responders identify hazardous materials involved in an incident, provide instructions on securing the scene, specify isolation areas dependent on multiple factors including wind, provide methods for mitigating impacts (such as from fire or spills), and recommend appropriate PPE for specific hazardous materials. (b) Level A PPE includes SCBA and a totally encapsulated chemical- and vapor-protective suit.

[11] RMS, an emergency response service company, provides chemical transfers, site remediation, and response services for train derailments, facility emergencies, or environmental incidents.

shipper or the emergency response number on the shipping papers, connecting to the shipper in Ohio, who as required by 49 *Code of Federal Regulations* (*CFR*) 172.604 must provide comprehensive emergency response and incident mitigation information. The shipping papers remained in the cab of the truck-tractor and were not retrieved by first responders.

1.5 Additional Information

1.5.1 Effects, Classification, and Transportation of Anhydrous Ammonia

Anhydrous ammonia is a colorless, toxic gas or liquid (when under pressure) with a noxious odor. Anhydrous ammonia is generally used as a fertilizer by injecting it into the soil; it is also used as a refrigerant in industrial applications. As a gas, ammonia is lighter than air. When compressed liquefied ammonia gas initially escapes a pressure vessel and encounters moisture in the air, it forms an anhydrous ammonia plume, as happened during this release. The gas reacts with moisture in the linings of body passages and cavities, including eyes, throat, lungs, and skin. When concentrated, anhydrous ammonia is corrosive to tissue.[12] The extent of injuries produced by exposure to anhydrous ammonia depends on the duration of exposure and the concentration of the chemical. Anhydrous ammonia is immediately dangerous to life or health at a concentration of 300 parts per million or higher.[13]

There is no antidote for anhydrous ammonia poisoning. First aid consists of decontamination, maintaining an open airway, and respiratory support followed by rapid transport to an advanced medical care facility. Children are at greater risk as they may receive higher concentrations based on lung surface area and body weight ratios.

Anhydrous ammonia has a global identification number of UN1005.[14] For transportation purposes, anhydrous ammonia is regulated differently depending on whether it is transported within the United States or internationally. According to 49 *CFR* 172.101, when transported domestically, anhydrous ammonia is classified as Division 2.2 hazmat with a requirement for "Inhalation Hazard" marking on packages

[12] When anhydrous ammonia comes in contact with water (including skin moisture), it forms ammonium hydroxide, which is corrosive.

[13] See "Ammonia," Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health.

[14] This identification number is a United Nations 4-digit number used to identify dangerous goods for travel; the numbers are set by United Nations Recommendations on the Transport of Dangerous Goods, Model Regulations.

(cargo tanks) and shipping papers (see figure 8).[15] Division 2.2 classification denotes "non-flammable, nonpoisonous compressed gas." However, when transported internationally, anhydrous ammonia carries Division 2.3 classification ("gas poisonous by inhalation").

The anhydrous ammonia classification resulted from a 1993 ruling by the Research and Special Programs Administration, whose functions were later incorporated into the Pipeline and Hazardous Materials Safety Administration (PHMSA).[16] In the ruling, the administration stated that "poison gas classification would be the best way to communicate the hazards of anhydrous ammonia." However, the agency noted that due to the "extremely large volume" of anhydrous ammonia being transported nationally and the "extensive worker knowledge of its hazards," it permitted the Division 2.2 classification with additional requirements for "Inhalation Hazard" marking.[17]

The Federal Motor Carrier Safety Administration (FMCSA) manages the national hazmat route registry; however, states determine the appropriate hazmat routes.[18] The registry contains designated, restricted roads and preferred highway routes for transporting all hazmat, as provided by states and tribal governments. Illinois has no dedicated or restricted hazardous material routes, and there are no restrictions on transporting anhydrous ammonia on US-40.

[15] (a) The special requirement for "Inhalation Hazard" marking is denoted by Special Provision #13 in column 7 of the hazardous materials table in 49 *Code of Federal Regulations (CFR)* 172.101. (b) For additional information about classification of hazmat divisions, see 49 CFR 173.115.

[16] (a) See 58 *Federal Register* 184 (September 24, 1993). (b) The Research and Special Programs Administration was part of the US Department of Transportation (USDOT) until 2004 when, based on 118 Statute 2024-2026, some of the scope of the agency's work was transferred to PHMSA and to the USDOT/Research and Innovative Technology Administration.

[17] See 55 *Federal Register* 246 (December 21, 1990).

[18] These requirements are set in 49 *CFR* Part 397, Subpart C.

Figure 8. Marking and placarding on the cargo tank. The left side of the cargo tank does not have soil deposits and the marking and placarding is clearly visible.

1.5.2 Vehicle Information

The postcrash inspection of the truck-tractor and cargo tank semitrailer revealed no preexisting deficiencies that would have caused or contributed to the crash. The postcrash examination of the cargo tank showed that it was properly placarded and marked. It further showed that it met the manufacturing standards that existed at the time of manufacture and would also meet current manufacturing standards.[19]

The cargo tank was subject to several federal requirements for regular maintenance and recertification.[20] The last recertification testing on the cargo tank was conducted in March 2023 by Paul Akers, Inc., and included two annual tests and two 5-year-interval tests. The FMCSA's postcrash inspection of the Paul Akers facility resulted in four violations, including two pertaining to the crash-involved cargo tank.

[19] The requirements for the design and construction of cargo tank trailers for a variety of compressed gases, including anhydrous ammonia, are specified in 49 *CFR* Part 173 Subpart G—Gases; Preparation and Packaging. Placarding requirements are specified in 49 *CFR* 172.313(a).

[20] See 49 *CFR* 180.407 and 49 *CFR* 180.415 for the specific requirements for maintenance and recertification.

One of these violations was for failing to perform the wet fluorescent magnetic particle test on the entire interior cargo tank head.[21]

Technicians from Mississippi Tank Company inspected the cargo tank and performed a wet fluorescent magnetic particle test on the head and all welds for signs of stress cracking. This test revealed two areas of stress cracking, but they were not near the area of puncture. The investigation could not determine whether these were precrash conditions.

1.5.3 Carrier Information

Prairieland Transport obtained a USDOT number and operating authority in December 2010. At the time of the crash, the carrier employed 11 drivers and operated a fleet of 5 truck-tractors, 4 dry van semitrailers, and 18 hazardous materials cargo tank semitrailers.[22] The carrier transported hazardous materials and general freight. When transporting anhydrous ammonia, including for the crash trip, the carrier operated under a federal agricultural exemption, which exempts drivers from hours-of-service (HOS) regulations when driving within a 150-air-mile radius of the source of the commodity. In the case of this crash trip, the exemption applied to operations within a 150-air-mile radius from Lima, Ohio.[23]

At the time of the crash, the FMCSA's Safety Management System indicated that Prairieland Transport had no alerts in any of the Behavior Analysis and Safety Improvement Categories (BASICs).[24] According to the Motor Carrier Management Information System profile, the carrier had one prior crash in the previous 4 calendar years, a non-injury crash in 2023.

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[21] A *wet fluorescent magnetic particle test* is a nondestructive method of detecting surface and subsurface flaws in ferromagnetic materials. It is conducted by applying a liquid layer of fluorescent magnetic particles and examining the magnetized surface under ultraviolet lights.

[22] The carrier also employed six owner/operators with leased truck-tractors and leased hazardous materials cargo tank semitrailers.

[23] See 49 *CFR* 395.1(k) and 49 *CFR* 395.3(b), as well as the FMCSA's regulatory guidance about the exemption. When a driver operating under an agricultural HOS exemption drives beyond the 150-air-mile radius, HOS regulations start to apply (starting at 0 hours), and the driver must also maintain logs using an electronic logging device. Any on-duty hours spent within the 150 air-mile radius do not count toward the driver's daily and weekly on-duty limits when traveling beyond the mileage limit. When that driver returns to within the 150-air-mile radius, the HOS count pauses.

[24] The only BASIC category in which the carrier had a value was for vehicle maintenance (for 55%). The alert threshold for the vehicle maintenance BASIC is 75% for hazardous materials carriers. The FMCSA organizes carrier data into seven BASICs: unsafe driving, crash indicator, HOS compliance, vehicle maintenance, controlled substances/alcohol, hazardous materials compliance, and driver fitness.

Prairieland Transport maintained the USDOT-required drug and alcohol testing program and kept proper driver qualification files for the crash-involved driver as required by regulations.[25] The carrier used a fleet management system that tracked vehicle movement and had functionality to alert the carrier about certain driver actions, such as speeding, hard braking, and stability events.[26] This system also featured a forward-facing camera that captured footage associated with triggered events. The system also provided electronic logging device functionality.

The carrier did not maintain a written safety policy or any written policies other than drug testing requirements. In the interview with the NTSB, the owner described some unwritten driver oversight approaches, including that two speeding alerts from the fleet management system would result in driver dismissal. Furthermore, when asked about the agricultural exemption and drivers working shifts longer than 14 hours, the owner stated, "we all do that every day in the ammonia season." Regarding rest between shifts, he stated, "I try to require them to get a minimum of 5 hours."

Prior to the crash, the carrier underwent one FMCSA compliance review in 2011, receiving a Satisfactory rating.[27] Following the crash, the FMCSA conducted a compliance review. The review identified 11 violations, one of which was critical.[28] The carrier received a Satisfactory safety rating.

1.5.4 Driver Information

1.5.4.1 Cargo Tank Driver

The combination vehicle driver had a commercial driver's license (CDL) with no restrictions and endorsements for double/triple semitrailers and tank/hazmat. His license was valid until December 2024, and he had no violations, suspensions, or withdrawals. He stated that he obtained his first CDL in 2021. The driver did not attend a professional driving school but learned to drive commercial motor vehicles from the owner of Prairieland Transport. The driver completed hazardous materials

[25] The USDOT drug and alcohol testing program is required by 49 *CFR* 382 Subpart C. Driver qualification files are required by 49 *CFR* 391.51.

[26] The carrier reported that it would review triggered events and conduct coaching sessions with drivers to address identified issues.

[27] FMCSA's safety ratings are regulated by 49 *CFR* 385.3. According to the regulations, a satisfactory safety rating "means that a motor carrier has in place and functioning adequate safety management controls to meet the safety fitness standard prescribed in 49 *CFR* 385.5. Safety management controls are adequate if they are appropriate for the size and type of operation of the particular motor carrier."

[28] The critical violation was for failure to retain a cargo tank manufacturer's data report certificate (49 *CFR* 180.417(a)(2)).

training as required by 49 *CFR* 172.704. He also had a valid 2-year medical certificate issued in September 2023.[29]

The driver's primary job at Prairieland Transport was shop foreman, conducting various tasks related to vehicle and cargo tank equipment, including leakage tests. In March 2023, he also began working as a driver on an as-needed basis. This was his first job as a commercial motor vehicle driver. The crash trip was his fifth trip for the 3-month period for which the NTSB requested records.[30] All trips involved transporting hazmat.

According to the driver's postcrash interview with NTSB investigators and phone records, he had about a 6-hour opportunity for rest the night before the crash. Based on the electronic logging device, he went on duty at 6:22 a.m. and had been on duty for about 14.5 hours when the crash occurred. Property-carrying commercial motor vehicle drivers are generally restricted to 14 hours of on-duty time per shift. However, because the driver was operating under an agricultural HOS exemption, most of the on-duty hours he accumulated did not count toward the 14-hour regulatory limit.[31]

In the previous 4 days (September 25–28), the driver worked as shop foreman, and interview and phone records indicated about a 7–8-hour opportunity for rest each night.

Examination of the driver's cell phone records showed that he used his cell phone numerous times while on duty on the day of the crash, including a 72-minute phone conversation with the carrier owner about 20 minutes before the crash. The driver stated that he used a hands-free device for these communications.[32]

Postcrash toxicology screening conducted by the Federal Aviation Administration's (FAA) Forensic Sciences Laboratory at the NTSB's request was positive for cetirizine, a second-generation antihistamine found in over-the-counter

[29] The medical certification requirements are set in 49 *CFR* Part 391 Subpart E.

[30] These five trips occurred between August 17, 2023, and the day of the crash, September 29, 2023.

[31] About 7.5 of the on-duty hours were within the 150-air-mile radius and therefore not counted toward HOS.

[32] According to 49 *CFR* 392.82, "no driver shall use a hand-held mobile telephone while driving a CMV [commercial motor vehicle]," although the code lists an exception for "when necessary to communicate with law enforcement officials or other emergency services." However, according to the FMCSA's final rule published at 76 *Federal Register* 75470 (December 2, 2011), calls may be made using a hands-free device.

products such as Zyrtec.[33] When the driver started working as a part-time driver in March 2023, he underwent a DOT-required pre-employment drug screening; the results were negative.

In the postcrash interview with NTSB, the driver reported noticing in his driver's side mirror that the minivan (he identified it only as a vehicle) was beginning a passing maneuver. The driver stated he assumed the minivan driver would postpone the passing maneuver, as he noticed a vehicle approaching from the oncoming direction. The driver reported looking back in the side mirror three times to see the minivan continuing the passing maneuver. The driver stated that he determined the minivan could not successfully complete the passing maneuver, at which point he decided "that I had to get out of the way and that's when I took the ditch." He reported feeling the tires hitting the gravel and the grass, and stated that he saw the culvert ahead as he was trying to control the vehicle.

1.5.4.2 Minivan Driver

The minivan driver was a 17-year-old with a probationary Class D Ohio driver's license with endorsement for motorcycles. Her license was issued in November 2022, when she was 16 years old, and was set to expire in February 2027.[34] Examination of Ohio driver records shows no violations, suspensions, or withdrawals.

To obtain a driver's license at this age in Ohio, a person must go through a graduated driver license program, which includes mandatory driving school.[35] Ohio has additional restrictions for drivers under age 18, including prohibitions on using any mobile communication devices while driving and restrictions on time-of-day driving (between midnight and 6:00 a.m.), and number of passengers (no more than one non-family passenger without parental supervision). The time in which the crash occurred, and the vehicle occupants—the driver's mother and brother—did not violate any of the probationary license restrictions for driving time of day or passengers.

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[33] Because the driver sustained serious injuries, Prairieland Transport was unable to conduct a postcrash test in accordance with USDOT requirements (49 *CFR* 382.303). The screening conducted by the FAA lab tested for substances included in DOT screening, as well as additional impairing substances.

[34] Ohio driver's licenses for drivers under age 21 are printed in portrait mode (the format some states use for graduated licensing restrictions), with "LIC NOVICE UNTIL [driver's birthdate]" printed on the license.

[35] (a) Ohio's graduated driver license program and its associated laws are covered on the state's website. (b) In Ohio, individuals under 18 become eligible to apply for a temporary instruction permit identification card at 15 years and 6 months of age. Novice drivers aged 16 or 17 must have a minimum of 24 hours of online or in-person classroom instruction and 8 hours of behind-the-wheel instruction to obtain a driver's license. The behind-the-wheel training must be completed at a traditional driving school.

In the postcrash interview by ISP, the driver reported passing the combination vehicle because it was varying its speed. During the passing maneuver, she reported accelerating to about 90 mph, in part because the oncoming vehicle was approaching faster than initially estimated.[36] She further stated that she initiated the passing maneuver in the passing zone and that her mother was nervous because of the oncoming headlights. The driver stated that she and the vehicle passengers were unaware that the combination vehicle had crashed and that they learned of the crash when watching the news. Furthermore, she stated that in the past she had instances of not accurately judging the distances and time needed to pass safely. The driver declined interview requests by the NTSB. Phone records show no cell phone use at the time of the crash. The investigation did not determine the minivan driver's sleep opportunity prior to the crash.

A witness operating a vehicle pulling a camper and driving behind the combination vehicle at an estimated speed of 58 mph reported the minivan previously passing his vehicle in an unsafe manner and almost colliding head-on with an oncoming vehicle. Shortly after, the witness observed the minivan passing the combination vehicle and reported being able to see the headlights of oncoming vehicles.

1.6 Postcrash Actions

1.6.1 Improvements to First Responder Planning and Response to Hazardous Materials Incidents

Following the crash, RuralMed conducted an after-action review with 12 local and county responding agencies, including representatives from Charleston Fire Department and other members of the hazmat team that entered the hot zone and patched the puncture on the cargo tank. As an outcome of the meeting, the group established an improvement plan with internal and external recommendations. These included conducting regular drills and tabletop exercises with other responding agencies in Effingham County, as well as improving planning and communication regarding decontamination stations adjacent to triage and medical transportation areas.

The Teutopolis Fire Department completed a postcrash anhydrous ammonia training covering emergency response procedures, including appropriate PPE. However, Charleston Fire Department hazmat team members and responders from other fire departments have not completed this training, citing cost concerns.

[36] ISP interviewed the driver 5 days after the crash.

1.6.2 Roadway Improvements

At the time of the crash, IDOT was in the final planning stage of a multiyear development program for 2024–2029. These plans included resurfacing, restriping, and replacing all reflective markers on US-40, and replacing two box culverts. Following the crash, IDOT evaluated these plans and added provisions for wider paved shoulders and rumble strips on US-40 in the crash area.

2. Analysis

At the time of the crash, it was dark, the weather was clear with no precipitation, and the roadway surface was dry. Although this section of US-40 did not feature roadside lighting, the passing zone in the crash area followed MUTCD guidelines as well as IDOT's own policy, and the no passing zone was appropriately marked.

The investigation found no evidence of impairment for the combination vehicle driver, and no evidence of fatigue in his performance. The driver's postcrash toxicological screening was negative for impairing substances, and he had worked 8–9 hours a day in the days preceding the crash. Furthermore, the investigation determined that the combination vehicle driver was properly licensed and was not using his phone at the time of the crash. The investigation also determined that the minivan driver was properly licensed, was not violating her probationary license restrictions, and was not distracted by her phone at the time of the crash.

The investigation determined that the mechanical condition of the truck-tractor and the construction of the cargo tank were not factors in this crash. The circumstances leading to the breach—a small object made of hardened steel impacting the cargo tank at a weld seam—are extremely unusual. A cargo tank with a capacity to withstand such impact forces would require a substantial increase in material thickness. The only other packaging containers with such extreme design characteristics are intended for the transportation of radioactive materials.[37]

The emergency response was timely and largely demonstrated effective interagency coordination. The medevac and ground transportation of injured people to appropriate medical facilities was efficient. Although the transportation process had some deficiencies related to staging of decontamination stations, many agencies involved in the response developed postcrash actions to address that deficiency.

The examination of video footage from the combination vehicle showed the minivan driver completing a passing maneuver in a no passing zone in an extremely dangerous manner with an approaching oncoming vehicle. While the combination

[37] The requirement for Type B packaging for transportation of radioactive materials is described in 10 *CFR* 71.51.

vehicle driver's rightward steering allowed the minivan to reenter the westbound lane, preventing a head-on crash between the minivan and the oncoming vehicle, the combination vehicle driver was unable to recover his vehicle to the westbound travel lane, leading to eventual overturning and release of anhydrous ammonia. While the combination vehicle driver had minimal experience as a CDL driver, he was aware of the hazardous movement of the minivan and took evasive action.

2.1 Risky Behaviors Among Teen Drivers

Although the 17-year-old minivan driver had a probationary license and had completed Ohio's graduated driver licensing program, her lack of experience was the primary reason for attempting the unsafe and illegal passing maneuver. This is supported by the driver's admission to ISP of having a history of incorrectly judging distances and the available time to complete certain driving actions.

The NTSB has examined the issue of teen driver safety for several decades, including the effectiveness of various educational programs and factors impacting teen driver safety. In 2003, the NTSB held a forum on driver education and made safety recommendations to the US Department of Education and National Highway Traffic Safety Administration to develop a model driver education and training curriculum (NTSB 2005; H-05-25) and encourage states to adopt driver training and graduated driver licensing qualifications (H-05-26).[38] Ohio's graduated driver licensing program meets the provisions laid out in our recommendations, and its driver education program teaches safe passing maneuvers and skills necessary to judge distances and reduce safety risks. Yet, as this crash shows, limited experience and young age contribute to poor judgment. Numerous research studies show that young drivers are more likely to engage in high-risk driving behaviors, such as speeding, following too closely, or unsafe passing.[39]

In recent years, the NTSB has hosted numerous webinars and roundtable discussions on teen driver safety.[40] However, we continue to see crashes involving teen drivers, including a 2022 crash in Tishomingo, Oklahoma, in which an impaired teen driver of a compact car failed to yield to a combination vehicle—resulting in the deaths of all 6 teen occupants of the compact car—and a 2023 crash in Excelsior, Wisconsin, in which a distracted teen pickup truck driver failed to respond in a timely manner to a stopped school bus, resulting in the death of one student pedestrian (NTSB 2024; NTSB 2025). The NTSB examined the issues of impairment and

[38] Safety Recommendations H-05-25 and -26 were classified "Closed—Acceptable Action" in February 2013.

[39] Smiley, Alison, ed. *Human Factors in Traffic Safety,* 3rd ed., 2015, pp. 124–137.

[40] The NTSB safety issues page for Teen and Young Driver Safety contains information about these educational and outreach events.

distraction for teen drivers from these two crashes, issuing several recommendations in those areas. While impairment and distraction were not issues in the Teutopolis crash, its circumstances demonstrate the ongoing challenges of inexperience among teen drivers. The NTSB's regular webinars and roundtable discussions serve to continually highlight teen driver safety concerns and reinforce the importance of graduated driver licensing programs and comprehensive driver education.

2.2 Safety Issue in Transportation of Anhydrous Ammonia

The NTSB has a long history of investigating crashes involving transportation of hazardous materials. Our concerns about transporting anhydrous ammonia date back nearly 50 years, when we investigated a crash in Houston, Texas, in which a truck-tractor combination vehicle with a cargo tank semitrailer carrying anhydrous ammonia left a ramp of an overpass and fell onto a freeway below, causing a breach in the cargo tank and releasing anhydrous ammonia (NTSB 1977). This resulted in 6 fatalities and injuries to 178 people, all of which, with the exception of 1 fatality, were due to anhydrous ammonia exposure. We issued numerous recommendations, including those for developing guidelines for identifying routes for transportation of hazardous materials and conducting research on vehicle stability when transporting liquid substances and reducing injuries from release of dangerous pressurized substances. These recommendations and related research led to improvements in those areas. More recently, in 2019, we investigated the release of anhydrous ammonia in Beach Park, Illinois, which occurred when a nurse tank was transporting the hazardous material from one field to another across a public road (NTSB 2022). The release was caused when the operator of the farm tractor towed the nurse tank after failing to close the valve on the tank.

The Teutopolis crash exemplifies the extreme danger of an anhydrous ammonia release and the exposure risk it can pose to the general public. Although toxic when inhaled and corrosive on contact with skin and other body parts, its classification as a Division 2.2 substance does not match its actual effects.

While the lowered classification level was made, in part, due to the high level of knowledge by those working with this hazardous material, the people affected in this crash were members of the general public. Yet even some first responders in this crash showed lack of proper planning regarding decontamination and insufficient understanding of and adherence to appropriate PPE requirements.

Even if anhydrous ammonia's classification status had matched its effects—had it been classified as Division 2.3 hazmat—there is no indication that transportation would have occurred differently in the Teutopolis crash. While Division 2.3 classification requires increased attention to carrier compliance records, additional inspections, and satisfactory safety ratings at the time of permit application, Division 2.2 and Division 2.3 hazardous materials share many of the same requirements,

including placarding, training, routing, and cargo tank construction. The carrier involved in the Teutopolis crash—Prairieland Transport—does not have a history of unsafe operation, and FMCSA's postcrash compliance review rated the carrier as Satisfactory.

Although this investigation found no evidence that the combination vehicle driver was fatigued, the broader issue of agricultural exemptions remains a concern. The carrier transports anhydrous ammonia under an agricultural exemption that permits drivers to work well beyond the hours that federal HOS regulations allow for drivers transporting general freight. NTSB's concerns about the safety of agricultural exemptions were highlighted in a recent investigative report examining a crash in Phoenix, Arizona. In that investigation, we recommended that the US Department of Transportation examine the safety performance of carriers using agricultural HOS exemptions (H-23-4) and require such carriers to implement a fatigue management program (H-23-5).[41]

3. Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the Teutopolis, Illinois, roadway departure and overturning of the combination vehicle was the unsafe passing maneuver by a teen driver that caused the combination vehicle driver to initiate an evasive action that resulted in loss of vehicle control and rollover. Contributing to the severity of the crash was the subsequent impact of the overturned cargo tank with a parked utility trailer that resulted in the release of anhydrous ammonia.

3.2 Lessons Learned

Risky Behaviors Among Teen Drivers. This crash demonstrates the ongoing challenges associated with teen driver inexperience, particularly in complex traffic situations requiring quick judgment. Even drivers who have completed comprehensive graduated driver licensing programs may lack the experience necessary to accurately assess distances and timing during high-risk maneuvers such as passing, especially in dark conditions. Educational institutions, driving schools, and parents should continue to emphasize the importance of conservative decision-making and the recognition that inexperience can lead to poor judgment regardless of formal training completion.

[41] Both safety recommendations are classified "Open—Await Response."

Safe Transportation and Incident Management of Anhydrous Ammonia. This crash also serves as a reminder that anhydrous ammonia, while classified as a Division 2.2 *non-flammable, nonpoisonous gas*, poses significant risks to public health when released. Emergency responders should prepare and use appropriate PPE and decontamination procedures when responding to incidents involving anhydrous ammonia, and they should verify the appropriate mitigation and protection procedures with the shipper of the hazardous material. The toxic and corrosive nature of this substance requires Level A PPE for safe entry into affected areas, and proper staging of decontamination stations is essential to prevent contamination of transport vehicles and medical facilities.

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NTSB investigators worked with the **Federal Motor Carrier Safety Administration**, **Pipeline and Hazardous Materials Safety Administration**, **Illinois Department of Transportation**, **Illinois State Police**, **Teutopolis Fire Protection District**, and **Mississippi Tank Co.** throughout this investigation.

person" (Title 49 Code of Federal Regulations section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 United States Code section 1154(b)).

For more detailed background information on this report, visit the NTSB investigations website and search for NTSB accident ID HWY23MH017. Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

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