

National Transportation Safety Board

Office of Highway Safety

Washington, DC 20594



HWY23MH017

HUMAN PERFORMANCE

Group Chair's Factual Report

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A. CRASH

Location: Teutopolis, Effingham County, Illinois
Date: September 29, 2023
Time: 8:41 p.m. CDT

B. HUMAN PERFORMANCE GROUP

Group Chair Rafael Marshall
 National Transportation Safety Board
 Washington, DC

C. CRASH SUMMARY

For a summary of the crash, refer to the *Crash Information and Summary Report*, which can be found in the docket for this investigation.

D. DETAILS OF THE INVESTIGATION

This crash involved a 2005 International 9900ix truck-tractor in combination with a 1978 Mississippi Tank Company MC331 cargo tank semitrailer (truck) and a subsequent hazardous material release that killed bystanders and motorists in the proximate location of the release. The truck was in the process of being passed on a two-lane rural road by a 2013 Toyota Sienna (passenger vehicle), with a vehicle approaching in the opposite direction, prior to it leaving the roadway and crashing. The Human Performance factual report describes information gathered on the drivers of the truck and the passenger vehicle, and on the behavioral, medical, operational, and environmental factors that may have contributed to the crash.

1.0 Truck Driver

1.1 Background and License History

The truck driver was a 24-year-old male with a Class A Illinois commercial driver's license (CDL) issued June 2022 and set to expire in December 2024. The license had no restrictions and endorsements for doubles/triples and tank/hazmat. According to the truck driver, he obtained his first CDL in January 2021. He stated that he was taught to driver commercial vehicles by his father and did not attend an official driving school. He obtained his learner's permit in early 2020 and held it for between 6-8 months. According to the Commercial Driver's License Information System (CDLIS), the truck driver did not have any violations, suspensions, or

withdrawals.¹ He had a valid 2-year Department of Transportation (DOT) medical certificate, issued September 2023 and expiring September 2025. His medical examiner was an advanced practice registered nurse listed in the Federal Motor Carrier Safety Administration's (FMCSA) National Registry of Certified Medical Examiners.

1.2 Employment with Prairieland Transport

Prairieland Transport (carrier) is owned and operated by the truck driver's father, who resides in the location of the carrier.

The truck driver had worked in the carrier's maintenance shop since May 2015, when he was 16.² As the shop foreman, he performed annual external visual tests and leakage tests on Prairieland's tank trailers, known as VK inspections.³ In this role, he would look at all the required decals on the trailer and make sure they were not faded, damaged, or defaced. He would inspect the piping and threads and check the integrity of the internal valves and secondary valves to detect leakage. He would inspect/repair the trailer for rust or dings/dents that could affect the thickness tolerances of the tank. He would also examine the air brakes and electrical systems to make sure that the trailer was safe to operate, although these items would not be repaired by him but by a certified mechanic. In the days prior to the crash, the truck driver was working on removing rust from a trailer and welding braces to its structure to prepare it for new axles.

In September 2021, the truck driver moved to Tulsa, Oklahoma, to enroll at Tulsa Welding School. While there, he worked as a floater for Twin Cities Ready Mix, a concrete supplier, where he operated concrete trucks within the company's yard but not on the road.⁴ After graduating from welding school, he returned to Prairieland Transport in May 2022 after 8 months in Tulsa.

While the truck driver primarily worked in the carrier's maintenance shop, he also transported commercial freight as needed for the carrier. According to the carrier, the truck driver began driving for the company in March 2023. From August 17 through September 29, he had transported 5 shipments, including the anhydrous ammonia involved in the crash (See Motor Carrier factual for more information). His trip on September 29 was only the second time in the month of September that he transported freight for the carrier, with the previous shipment having gone to Mayfield, Kentucky. He was assigned the truck, with which he was very familiar, having driven it "many times."

¹ Human Performance Attachment - Truck Driver License History.

² Human Performance Attachment - Truck Driver Interview.

³ These inspections are referred to as "VK inspections."

⁴ A floater is a position filled by an individual who is not assigned to one location or task.

It should be noted that drivers transporting anhydrous ammonia for farm use within a 150-air mile radius of the commodity source are exempt from hours of service (HOS) regulations, under the agricultural exemption (AG) regulations.⁵ See the docket for additional explanation.

1.2.1 Training

According to the carrier, drivers were hired through word of mouth and were required to have at least two years of driving experience and a clean driving record. The carrier preferred drivers who did not have hazardous material hauling experience, making it the company's responsibility to train them. As part of onboarding, the carrier required each driver haul at least 5 loads while supervised before they were allowed to work independently. According to the carrier, the company did not have a formal training program and drivers were not provided with a Driver Handbook. The carrier trained them on the electronic logging device. Personnel from HazMat Resources, Inc., provided hazardous material training customized to the carrier's operation to new drivers. The carrier held hazmat retraining every 3 years. The carrier also held an annual safety meeting. The last annual meeting was February 2023.

The truck driver did not attend a professional driving school but learned to drive a commercial vehicle from his father. His father stated that he trained the truck driver himself over a span of one year. In the truck driver's qualification files is a completed Prairieland Driver's Road Test Examination form and road test certificate dated March 2023, which indicated that the truck driver was competent at conducting pre-trip inspections, coupling and uncoupling combination units, placing the equipment in operation, using the vehicle's controls and emergency equipment, operating the vehicle in traffic and while passing other vehicles, turning the vehicle, braking or otherwise slowing the vehicle, backing and parking, and was familiar with tank trailers.

With regards to hazardous materials training, the truck driver stated that his first formal training was in October 2015 through HazMat Resources, Inc. He was taught general awareness hazardous material safety training and learned how to perform VK inspections on the trailers. He has since attended all the annual safety meetings held by the carrier, many of which were also conducted by Hazmat Resources, Inc. His driver qualification file contained a certificate from September 2021 entitled, "DOT General Awareness, Function Specific and General Security Awareness Training," indicating that the truck driver had completed 6-hours of hazardous materials training within the past 3 years related to the operation of cargo tanks transporting hazardous materials, as required by 49 *Code of Federal Regulations* 172.704

⁵ 49 CFR § 395.1(k).

1.2.2 Drug Testing

The carrier had a drug testing policy and kept paperwork on previous drug tests. It used Transport Safety Services (TSS) to perform pre-employment, random, and post-crash drug tests. The truck driver completed a pre-employment drug test in March 2023 and his results were negative for cocaine, marijuana, phencyclidine, amphetamines, and opiates.⁶ The truck driver was part of a random pool of drivers, but he had never been selected for testing.

1.3 72-Hour History

1.3.1 Preceding Days

NTSB investigators interviewed the truck driver on October 6, 2023, in the presence of carrier owner and an attorney. Because the truck driver was still recovering from ammonia inhalation, the interview was suspended after one hour and resumed on October 11, 2023.

According to the truck driver, on Tuesday, September 26th, he woke up around 5:45 a.m. and felt rested.⁷ He completed his morning routine, then left the house around 6:45 a.m. He arrived at the carrier at 7:30 a.m. He worked at the maintenance shop that day, with the goal of preparing a trailer for new axles. He spent most of the day cleaning paint and rust from the trailer and getting the surfaces ready for welding. He completed his day around 5 p.m. (See Table 1 for the truck driver's hours of service based on his timecards, which at times differ slightly from his recollections). Since his mother was feeling sick, he helped his brothers and some friends cook supper that night, then he stayed for a little while after eating. He got home and went to bed somewhere around 10:30 p.m. on Tuesday night.

On Wednesday, September 27th, he again awoke around 5:45 a.m. and felt rested. He completed his morning routine, then left the house around 6:45 a.m. He arrived at the carrier at 7:30 a.m. He started the day cleaning paint and rust from the trailer and getting the surfaces ready for welding. Later that day, he started cutting and fabricating metal braces and welded them on the inside of the trailer. He finished work around 4:30 p.m. He left the carrier, bought supper at a fast-food establishment, and attended bible study at 7 p.m. Afterwards, he departed for home and went to bed between 9:30 p.m. and 10 p.m. (phone records indicate this time was a little after 10 p.m. See Figure 1).

On Thursday morning, September 28, he once again awoke at 5:45 a.m. and felt rested. He completed his morning routine, then left the house around 6:45 a.m. He arrived at the carrier at 7:30 a.m. He spent his entire day welding and fabricating

⁶ Human Performance Attachment - Truck Driver Drug Test Results.

⁷ Times throughout this report are in Central Daylight Time.

braces on the trailer. He ended work around 5:15 p.m. He had supper with his mother and father. The family had guests, and he stayed with them until around 8 p.m. Around that time, he learned from his father that there was a load that needed to be picked up the next day, so he departed for home. He was in bed by 10 p.m.

Table 1. Reconstruction of the truck driver’s hours of service from September 22-28, 2023, based on his timecard.

Date	Start time	End time	Total Hours	Status	Location
9/22/23	7:30 am	4:00 pm	8:00	Shop	Brownstown, IL
9/23/23	Off duty	0	0	NA	NA
9/24/23	Off duty	0	0	NA	NA
9/25/23	7:30 am	5:30 pm	9:30	Shop	Brownstown, IL
9/26/23	7:30 am	5:00 pm	9:00	Shop	Brownstown, IL
9/27/23	7:30 am	5:00 pm	9:00	Shop	Brownstown, IL
9/28/23	7:30 am	4:30 pm	8:30	Shop	Brownstown, IL
Total Hours			36.0		

1.3.2 Day of the Crash

According to the truck driver, on the day of the crash, the plan was to pick up anhydrous ammonia from Lima, Ohio, and bring the load back to the carrier’s facility in Brownstown, Illinois, before delivering the load the next morning. He stated that he was familiar with the route, having driven most of it before, although not always in a commercial vehicle.

He woke up around 4:15 a.m. on Friday, September 29. He left his home in Carlyle, Illinois, and drove about 45 minutes to Brownstown to pick up the truck-tractor. This was a truck-tractor with which he was very familiar. Based on the truck’s ELD, he left Brownstown at 6:22 a.m. and drove the truck-tractor to Stewardson, in Shelby County, to pick up an empty trailer (see Table 2). He performed a pre-trip inspection and noted that the truck and trailer were “running fine.” He left Stewardson at 7:31 a.m. He took I-70 and stopped at a rest stop in Crown Center, Indiana, where he switched his ELD to the AG exemption at 9:46 a.m. (the truck driver’s ELD did not have a setting specifically for the AG exemption, so he would set it to “off-duty” or “sleeper berth”). He then drove to Lima, Ohio, and arrived at the terminal at 1:33 p.m. He left the terminal 50 minutes later and fueled his truck. His plan was to bring the load back to Brownstown and spend the night there before delivering it on Saturday morning. He followed the same route back home, stopping to get a sandwich around 3 p.m. at Fort Shawnee, Ohio. He switched his ELD back to normal logs in Crown Center, Indiana, at 6:55 p.m. Around Terre Haute, Indiana, he received a call from his father, and he conversed with him using a hands-free Bluetooth device for 72

minutes.^{8,9} His father told him that I-70 was shut down between Greenup and Effingham because of a crash and suggested that he take US-40 from Casey, Illinois, to Effingham, then get back on I-70.

Table 2. Reconstruction of the truck driver’s hours of service on September 29, 2023, based on his electronic logging device.

Start	End	Hours	Start	End	Distance
6:22 a.m.	7:17 a.m.	0:55	St. Peter, IL	Shelby County, IL	42.7
7:31 a.m.	9:46 a.m.	2:15	Shelby County, IL	Crown Center, IN	129
9:46 a.m.	N/A	Begin Agricultural Exemption			
9:46 a.m.	9:56 a.m.	0:10	Crown Center, IN	Hendricks County, IN	10
10:05 a.m.	1:33 pm	3:28	Hendricks County, IN	Lima, OH	188
2:23 p.m.	2:40 p.m.	0:17	Lima, OH	Fort Shawnee	4
3:01 p.m.	3:15 p.m.	0:14	Fort Shawnee, OH	Cridersville, OH	7
3:15 p.m.	4:13 p.m.	0:58	Cridersville, OH	SR-18, Bryant, IN	46
4:25 p.m.	6:55 p.m.	2:30	SR-18, Bryant, IN	Crown Center, IN	142
6:55 p.m.	N/A	End Agricultural Exemption			
6:55 p.m.	8:41 p.m.	1:46	Crown Center, IN	Crash Location	108
Total Driving Hours		12:33	Total Miles		676.7
Total On-Duty Hours		14:19			

The truck driver exited I-70 at Casey. He stated that traffic on US-40 was ‘busy’ and supposed that much of the traffic was attempting to avoid the crash on I-70. Sometimes there was a gap of a mile or two with no traffic, then there would be long lines of bumper-to-bumper traffic. At one point, he remembered a vehicle in the opposing lane attempting a passing maneuver by entering his lane even though there was very little room to do so - he slowed his vehicle to let them back in to avoid a head-on collision.

As he drove between Montrose and Teutopolis at a speed of around 57 or 58 mph, he noticed in the driver’s side mirror that a vehicle was beginning a passing maneuver. He assumed that the vehicle would postpone the passing maneuver upon seeing that vehicles were approaching from the opposite direction. However, the vehicle continued with the passing maneuver. The truck driver looked back about three times as the vehicle continued to pass into opposing traffic. Eventually, the truck driver concluded that it would not be possible for the vehicle to complete the maneuver successfully or to get back behind his truck, so he decided that he’d need to get out of the way towards the ditch.

⁸ 49 Code of Federal Regulations, Subpart H, states that no driver may use a hand-held mobile telephone or engage in texting while driving a CMV, communicating with law enforcement officials or other emergency services. Calls may still be made if a driver uses a hands-free device.

⁹ According to Prairieland Transport, the company has a hands-free policy. If a driver did not have a hands-free Bluetooth device, the company furnished one. If a driver was caught using a hand-held phone, he or she was fined by the company. See Motor Carrier Attachment - Prairieland Transport Owner Interview.

As he moved his vehicle towards the ditch, he felt the tires hitting the gravel and grass and tried to control the vehicle. He saw that he was approaching a culvert and remembered hitting the culvert, falling over, and crashing. After the truck came to a stop, he heard a "funny roar." He initially thought the truck engine was malfunctioning and reached for the key to turn off the truck. However, he started to smell the anhydrous ammonia and knew his truck was venting the gas and he had to get out. He unbuckled his seatbelt and attempted to exit through the passenger door of the overturned truck cab but was unable to do so. He eventually exited through an opening through the windshield or window, although he couldn't tell which.

Upon exiting the vehicle, he saw the anhydrous ammonia gas moving towards the rear of the truck-tractor and ran east away from the fog. He walked until he approached a pickup truck hauling a camper. The front passenger door opened, and a lady stepped out and asked if he was the driver of the truck. She stated that she had 9-1-1 on speaker phone. The truck driver told the dispatcher that there was a massive anhydrous ammonia leak and to send as much water as possible to the crash site. The 9-1-1 operator told the lady to tell people to evacuate the area. Afterwards, he started walking with the lady and her family east to warn people to get away from the area. He then called the carrier about the crash using one of the family member's phones.

The truck driver recalled that the speed limit for the stretch of roadway between Montrose and Teutopolis was 55 mph. He stated he had been traveling 57 to 58 mph. He described the weather as "fairly clear" and the lighting conditions as dark, "just your normal nighttime driving conditions."

1.4 Health History

The truck driver's most recent DOT medical certificate was issued the day before the crash. His uncorrected visual acuity and hearing were within regulatory thresholds. The medical examiner noted no issues upon physical examination of the truck driver.

When interviewed by the NTSB, he stated that he was not prescribed prescription medication, and used nasal over-the-counter medication for seasonal allergies (Zyrtec and Flonase). The week prior to the crash, he caught a cold and had been taking Dayquil as needed to help mitigate the symptoms. He stated to NTSB investigators that the last time he took Dayquil was about two days prior to the crash date. The truck driver further stated that he did not drink alcohol or take any type of recreational drug.

The truck driver described his sleep hygiene as good. He stated that he typically fell asleep within five to 10 minutes of lying down. He usually obtained six to seven hours of sleep a night and felt refreshed when waking up.

1.5 Toxicology

The truck driver was injured from the anhydrous ammonia release and was airlifted to Springfield Memorial Hospital in Springfield, Illinois. The carrier was unable to conduct a post-crash DOT drug test.¹⁰ The NTSB obtained a sample of the truck driver's blood from Springfield Memorial Hospital and sent it to the Federal Aviation Administration's (FAA) Forensic Sciences Laboratory, which can analyze specimens for a broad range of potentially impairing drugs. The results indicated that the truck driver's blood was positive for cetirizine, a second-generation antihistamine found in such over-the-counter products as Zyrtec. The results also identified drugs that were administered during post-crash medical care.

1.6 Technology in the Truck

NTSB investigators queried the truck driver about the types of technology in his truck and how he interacted with them during the accident trip. According to the truck driver, the truck was equipped with a Samsara dashcam and tracker (fleet management system). He stated that he usually didn't interact with those at all. He also had a tablet computer with him, which contained his ELD. He also used the tablet computer for navigation and music streaming on the day of the crash. Finally, he had his personal phone with him in the cab, which was connected to a Bluetooth device for voice calls.

1.7 Phone Records

NTSB investigators obtained the truck driver's phone records for the 72-hours prior to the crash.¹¹ Investigators also obtained the truck driver's phone from the wreckage of the truck and had the contents extracted using Cellebrite at NTSB headquarters in Washington, D.C. Figure 1 illustrates the truck driver's phone use in blue (e.g., Web use, calls, and texting using both the phone native application and third-party applications), along with his hours of service and reported time in bed. Phone use times aligned well to his reported time in bed.

¹⁰ These tests screen for the following drugs or drug classes: marijuana, cocaine, opioids (codeine, morphine, heroin, hydrocodone, hydromorphone, oxycodone, oxymorphone), phencyclidine (PCP), amphetamines, methamphetamines, and methylenedioxymethamphetamine (MDMA).

¹¹ Human Performance Attachment - Truck Driver Phone Records.

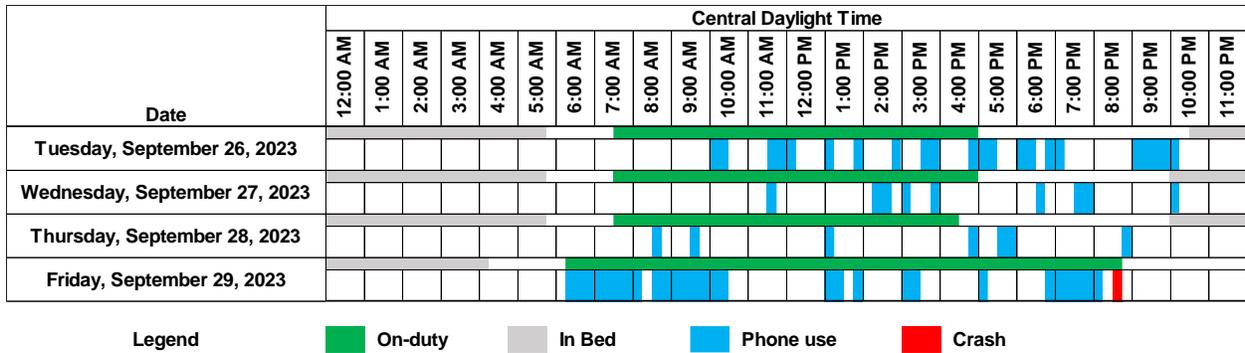


Figure 1. Truck driver phone use, timecard hours, and reported time in bed. Phone use is shown as a contiguous block if less than 15 minutes separated the time between outgoing texts or phone calls.

2.0 Passenger Vehicle Driver

2.1 Background and License History

The passenger vehicle driver was a 17-year-old female with a Class D Ohio noncommercial driver’s license issued in November 2022 and set to expire in February 2027. She had a corrective lens restriction and was endorsed to operate motorcycles.^{12,13} Her license history indicates no violations, suspensions, or withdrawals. The passenger vehicle driver’s license was printed vertically in portrait mode, a format that some states use to identify drivers who are still under graduated licensing restrictions. In Ohio, the licenses of all drivers under 21 use this format. On the left side of the license is printed “LIC NOVICE UNTIL [driver’s birthdate].”

According to the Ohio Motorcycle Operator Manual, a motorcycle endorsement can only be granted to minors who have completed the Motorcycle Ohio Basic Course and who have completed graduated driver licensing (GDL) requirements.¹⁴ Investigators contacted the Ohio Bureau of Motor Vehicles for clarification, and a representative stated that a motorcycle endorsement may be obtained after holding a Temporary Instruction Permit Identification Card (TIPIC) learner's permit for six months.

2.2 Statements Regarding Crash

The Illinois State Police (ISP) interviewed the passenger vehicle driver on October 4, 2023, five days after the crash.¹⁵ According to the passenger vehicle driver, on that night, she had been driving, her mother had been in the front

¹² The Illinois State Police interviewed the driver after the crash and asked if she was wearing corrective lenses at the time of the crash. The driver did not understand the question as it was stated and did not answer in a clear manner, although she did state, “So if I take out my contacts, I can’t see very well.”

¹³ Human Performance Attachment - Passenger Vehicle Driver License History.

¹⁴ [MOP0001.pdf \(ohio.gov\)](#). Accessed January 11, 2024.

¹⁵ Human Performance Attachment - ISP Interview with Passenger Vehicle Driver.

passenger seat, and her brother had been in a rear passenger seat. Everyone had been awake. They had started their trip in Xenia, Ohio, and were on their way to a location near Highland, Illinois. They had been on I-70 but diverted to US-40 because of a reported crash on I-70. She described the traffic on US-40 as heavy and occupied by many trucks. She stated that she was behind several trucks, and she remembered passing two or three vehicles. One such vehicle was a box trailer or recreational vehicle, which was going "super-duper slow," so she passed it. She also remembered passing the crash-involved truck shortly before reaching Teutopolis. During the passing maneuver, she thought she needed to go faster than usual because of the distance [length of truck], and estimated that she was probably going 90 mph. During the passing maneuver, she stated that her mother got nervous because of the oncoming headlights. She stated that her mom was "tired of my driving style." After they stopped for gas, her mother told her brother to take over driving.

She stated that she passed the crash-involved truck because it would vary its speed "for no reason." When asked by ISP if she remembered seeing the No Passing Zone sign, she stated that she did not recall seeing it but was positive that there were broken lines on the pavement when she began her passing maneuver (for more about the No Passing Zone, See Highway Factors Factual Report). She further stated that she really felt she had enough time to pass the crash-involved truck, but that the oncoming vehicle might have been coming faster than she thought, which was why she sped up.

When told by the ISP that the truck she passed had crashed while giving her enough room to complete her passing maneuver, the passenger vehicle driver appeared very distraught and stated adamantly that she nor her passengers had realized that it crashed. She stated that their first realization that there was a crash was from the news. She remembered seeing emergency vehicles going east on US-40 before she reached the gas station. She stated, "I've honestly in the past had times when I just don't use good judgment in judging like distances and whether I have enough time for something."

The driver retained an attorney after her interview with ISP. NTSB investigators contacted the driver's attorney and were advised the passenger vehicle driver declined further interviews.

2.3 Witness Statements

NTSB investigators interviewed a witness who had been traveling behind the crash-involved truck, and who had also been passed by the passenger vehicle driver while on US-40.¹⁶ According to the witness, his vehicle was pulling a 35-foot camper and was about a hundred yards or more behind the truck, traveling at a speed of about 58 mph. A vehicle approached the rear of his vehicle and passed him, nearly

¹⁶ Human Performance Attachment - Witness Interview.

having a head-on collision with an approaching vehicle as it did so. The witness commented to his wife about the unsafe maneuver. A little while later, the same vehicle began to pass the truck in front of them. The witness stated that he could see the headlights of the oncoming vehicles in the opposite lane and was hollering to the vehicle to get back behind the truck. The witness stated that they were too far back to see if the vehicle hit the truck or just cut the truck driver off, but he then saw the truck swerve right, leave the pavement, and roll. The witness did not remember if the truck braked during the sequence of events. The witness immediately stopped his vehicle about 50 yards away from the wreckage and saw a white gas coming out of the truck. He did not smell ammonia and surmised that the wind was pushing the gas away from him. He believed his son called 9-1-1 immediately after the incident.

The witness stated that he did not know if the truck would explode so he backed his vehicle up as far as he could. After doing so, he saw the truck driver jump from the cab of the truck and start running in the direction of his vehicle. He and the other passengers in his vehicle exited and stopped the truck driver, asking if he was okay. The truck driver was frantic and started shouting about anhydrous ammonia and how they had to evacuate. At that point, the truck driver used the witness' cell phone to call the carrier about the crash. They evacuated down the roadway, telling other motorists to do the same, but the witness also stated that he returned to his vehicle shortly afterwards, turned it around, and traveled east towards Montrose.

2.4 Phone Records

NTSB investigators obtained the passenger vehicle driver's phone records from September 26 - September 29, 2023.¹⁷ The records indicated that during this span of time, the passenger vehicle driver made 5 text messages and no phone calls. She owned an iPhone 13 Pro Max, and texts between iPhones, as well as texts made using a third-party application, would not appear on the phone records. Data from her phone records were not enough to estimate the passenger vehicle driver's sleep opportunity prior to the crash, and they did not provide evidence of phone use at the time of the crash.

2.5 Ohio Driver's Manual

Several items from the Ohio Driver's Manual are relevant in this case, especially since the passenger vehicle driver can be considered a novice driver. First, page 7 of the Manual states that, "Aggressive driving occurs when an individual intentionally commits an action that endangers other persons or property." Page 11 shows typical "Warning signs," explaining that they are signs that "tell a driver of a possible danger that might be ahead." Among these signs is the "No Passing Zone" sign, which indicates that passing is prohibited. Pages 13, 20, and 21 explain the markings on

¹⁷ Human Performance Attachment - Passenger Vehicle Driver Phone Records.

the road indicating when passing is allowed, stating, "Do not attempt to pass when...an oncoming vehicle is approaching."

2.6 Ohio Driver's Education and GDL Program

The passenger vehicle driver obtained her license in November 2022, when she was 16 years old. At the time of the crash, she had possessed her license for 10 months. In Ohio, individuals under 18 become eligible to apply for a temporary instruction permit identification card (TIPIIC) at 15 years and six months of age.¹⁸ They may obtain the TIPIIC once they pass a 40-item multiple choice knowledge test and vision screening. Novice drivers under 16 years who possess a TIPIIC may drive if a parent, guardian, or licensed driving instructor is in the passenger seat. Novice drivers over 16 may drive with any valid licensed driver over 21 years in the passenger seat, except from Midnight to 6 a.m., when the novice driver must be accompanied by a parent, guardian, custodian, or approved licensed driver 21 years or older.¹⁹

Novice drivers with a TIPIIC must also register for driver education. 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 license. The behind-the-wheel training must be completed at a traditional driving school. In addition, novice drivers must also complete at least 50 hours of in-car practice (10 hours of which must be at night) with a parent or legal guardian. Once these requirements are met, novice drivers may schedule a driving test to obtain a probationary license.

NTSB investigators requested a list of required topics to be taught to new drivers from the State Administrator of Driver Education & Training, Ohio Department of Public Safety. The list provided indicated that safe passing was among the topics that were required to be taught during the driver education course and during the behind-the-wheel instruction.²⁰ It is also among the lessons parents/guardians are urged to teach novice drivers.²¹

Once the driving test has been passed, novice drivers may obtain a probationary license. During the first full year of licensure, probationary licensed drivers are:

- Prohibited from driving between midnight and 6 a.m., unless accompanied by a parent or guardian, or unless they are driving 1) to or from work, 2) to

¹⁸ [Ohio BMV](#). Accessed January 22, 2024.

¹⁹ Approved drivers are those who have been named on a notarized BMV 2438 form ([bmv2438.pdf](#) ([ohio.gov](#))).

²⁰ Human Performance Attachment - Ohio Driver Training Curriculum Checklist.

²¹ [Parents & Teens | Ohio Traffic Safety Office](#). Accessed January 30, 2024.

or from an official church function, 3) to or from a school activity, or 4) in an emergency

- May not drive with more than one person who is not a family member unless accompanied by a parent, guardian or legal custodian
- Must ensure that all passengers are belted in the vehicle

Drivers who have held a probationary license for more than one year but are still not 18 years old:

- Are prohibited from driving between the hours of 1 a.m. and 5 a.m., unless accompanied by a parent or guardian, with the same exceptions noted above
- May not carry more occupants in the vehicle than the total number of originally installed seatbelts.
- Must ensure that all passengers are belted in the vehicle

Drivers under the age of 18 are not permitted to use any type of mobile communication device while driving, meaning that they are not allowed to text or talk even at stop signs or red lights.²² License restrictions end when drivers turn 18. At that point, all driver licenses are unrestricted licenses.

2.7 Research on Driver Passing Maneuvers

In 2020, passing or overtaking maneuvers resulted in 862 deaths, or 1.9% of all traffic fatalities.²³ It is commonly understood that overtaking another vehicle is one of the most complex driving maneuvers, since a driver “must simultaneously estimate the time to collision (TTC) with an oncoming car, monitor the TTC with the lead vehicle so as to avoid a rear-end collision, and estimate the time required to complete the overtake based on the current speed, road conditions, and knowledge of the capabilities of the vehicle.”²⁴

There has been much research on the influence of highway design on passing maneuvers; however, there have been relatively few studies on the role of human perception in passing-related crashes. Gordon and Mast (1970) found that drivers often underestimated the distance it would take to pass another vehicle, with the

²² In Ohio, it is illegal to use or hold a cell phone or electronic device in your hand, lap, or other parts of the body while driving on Ohio roads. Drivers over 18 years old may make or receive calls via hands-free devices, including, 1) speakerphone, 2) earpiece, 3) wireless headset, 4) electronic watch, and 5) connecting phone to vehicle.

²³ National Highway Traffic Safety Administration. Traffic Safety Facts 2020. 2022, Washington, DC.

²⁴ Gray, Rob, and David M. Regan. "Perceptual processes used by drivers during overtaking in a driving simulator." *Human factors* 47, no. 2 (2005): 394-417.

degree of underestimation increasing with higher speeds.²⁵ Similarly, Clarke et al. (1998) found that drivers often misjudged the time it would take to overtake a vehicle.²⁶ It has also been found that driver generally have difficulty judging absolute distances, often misjudging the distance of an oncoming vehicle. While in the case of passing in the presence of an oncoming vehicle, the passing driver could theoretically rely on the rate of image expansion on his/her retina to judge distance and approach speed, the distances involved could result in a rate of expansion that is below the threshold of detection.²⁷ As stated by Gray and Regan (2005), "becoming a safe driver may require learning in which situations visual perception can and cannot be trusted."

E. GENERAL FACTORS

1.0 Weather

The closest official National Weather Service weather station to the crash site was located approximately 2 miles southeast, in the town of Teutopolis (KILTEUTO3). Observations closest to the time of the crash are shown in **Table 3**.

Table 3. Weather data from weather station KILTEUTO3.

Time (CDT)	8:45 p.m.
Temperature	72° F
Dew Point	60° F
Humidity	63%
Pressure	30.04 in
Wind Dir.	ENE
Wind Speed	0 mph
Wind Gust Speed	0
Precipitation	0.0
Events	None
Conditions	N/A

²⁵ Gordon, Donald A., and Truman M. Mast. "Drivers' judgments in overtaking and passing." *Human Factors* 12, no. 3 (1970): 341-346.

²⁶ Clarke, David D., Patrick J. Ward, and Jean Jones. "Overtaking road-accidents: Differences in manoeuvre as a function of driver age." *Accident Analysis & Prevention* 30, no. 4 (1998): 455-467. Clarke et. al. also found that while younger drivers were over-represented in some types of passing crashes, they were not so in possible head-on crashes like that encountered by the Teutopolis passenger vehicle driver.

²⁷ Gray and Regan (2005).

2.0 Astronomical Factors

According to the Earth System Research Laboratory/Global Monitoring Division of the National Oceanic and Atmospheric Administration, apparent sunrise in the immediate area of this crash occurred at 6:48 a.m., and apparent sunset occurred at 6:40 p.m. This crash occurred at 8:41 p.m., during the nighttime hours.

F. DOCKET MATERIAL

The following attachments are in the docket for this investigation:

LIST OF ATTACHMENTS

- Human Performance Attachment - Truck Driver License History
- Human Performance Attachment - Truck Driver Interview
- Human Performance Attachment - Truck Driver Drug Test Results
- Human Performance Attachment - Truck Driver Phone Records
- Human Performance Attachment - Passenger Vehicle Driver License History
- Human Performance Attachment - ISP Interview with Passenger Vehicle Driver
- Human Performance Attachment - Passenger Vehicle Driver Phone Records
- Human Performance Attachment - Witness Interview
- Human Performance Attachment - Ohio Driver Training Curriculum Checklist

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