



# National Transportation Safety Board

Washington, DC 20594

## Highway Accident Brief

### Multivehicle Collision and Postcrash Fire in Partially Stopped Traffic on Interstate 290, Elmhurst, Illinois, March 1, 2018

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<b>Accident Number:</b>	HWY18MH007
<b>Accident Type:</b>	Multivehicle collision
<b>Location:</b>	Interstate 290 (I-290) east near milepost 14.9 in Elmhurst, Cook County, Illinois (western outskirts of Chicago)
<b>Date and Time:</b>	March 1, 2018; 1:49 p.m. central standard time
<b>Vehicles:</b>	2016 Kenworth truck-tractor in combination with a 2012 Wabash semitrailer (Pioneer truck); 2004 Chrysler Sebring; 2013 International truck-tractor in combination with a 1996 Strick trailer; 2009 Peterbilt truck-tractor in combination with a 2014 Wabash semitrailer; 2016 Subaru Outback; 2016 Ford Explorer; 2018 Toyota Sienna
<b>Fatalities:</b>	1
<b>Injuries:</b>	5

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### Crash Description

About 1:49 p.m. on Thursday, March 1, 2018, a multivehicle collision occurred in partially stopped traffic on I-290 east near milepost 14.9 in Elmhurst, Cook County, Illinois. At this location, I-290 has three travel lanes and paved shoulders in each direction, separated by a concrete barrier. The posted speed limit is 55 mph. The weather was overcast with no precipitation, and the roadway was dry.

The striking vehicle was a 2016 Kenworth truck-tractor in combination with a 2012 Wabash enclosed van semitrailer, operated by Pioneer Transportation Ltd. The Pioneer truck had just entered I-290 east from the St. Charles Road interchange and was traveling in the right lane when it collided with the rear of a 2004 Chrysler Sebring, pushing the car forward into the rear of a 2013 International truck-tractor in combination with a 1996 Strick intermodal trailer, also in the right lane, operated by New Pro-Freight Inc. These impacts caused the New Pro-Freight truck to move forward, colliding with the rear of a 2009 Peterbilt truck-tractor in combination with a 2014 Wabash semitrailer, operated by Schneider National Carriers Inc. The collision also caused the rear of the intermodal trailer of the New Pro-Freight truck to rotate left into the center and left eastbound lanes and collide with a 2016 Subaru Outback, which was passing the slower-moving vehicles in the left lane. The Subaru then struck the rear of a 2016 Ford Explorer and was struck by a 2018 Toyota Sienna. Based on witness interviews, although vehicles were stopped or moving

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slowly in the right lane, the general flow of traffic in the center and left lanes was moving close to the posted speed limit of 55 mph.

The Chrysler came to rest in the center lane between the swung-out intermodal trailer and the Pioneer truck, where a postcrash fire, originating from the Chrysler's fuel tank, ensued. The driver of the Chrysler was fatally injured, and the car was consumed in the fire. The intermodal trailer, Pioneer truck, Subaru, and Toyota also sustained fire damage. Five of the six remaining drivers sustained minor injuries, and the driver of the Toyota was uninjured. There were no passengers in any of the seven vehicles involved. Figure 1 shows the final rest positions of the vehicles.



**Figure 1.** Six of the vehicles at final rest on I-290 east. The photo on the left shows the scene looking toward the east; the photo on the right depicts the crash site looking toward the west. (Source: WFLD-TV)

### Highway Information

**Roadway Location.** The crash occurred on eastbound I-290 just south of the St. Charles Road interchange, near the end of the acceleration lane from St. Charles Road onto I-290, a metered on-ramp. The crash location lies between major interchanges with Interstate 294 (I-294) and Interstate 88 (I-88). I-290 is a concrete-paved roadway with three 12-foot-wide travel lanes in the eastbound direction. The roadway is separated from the westbound lanes by a concrete median barrier.

**Recurring Congestion.** According to the Illinois Department of Transportation (IDOT), average daily traffic in this area of I-290 was 134,000 vehicles, of which 13 percent were truck-tractor combination vehicles. At the request of the National Transportation Safety Board (NTSB), the week after the crash, IDOT activated the recording function on the traffic camera at the St. Charles Road interchange. Beginning at 1:45 p.m. on Thursday, March 8, 2018, the camera recorded the traffic queue in 15-minute segments. The IDOT assessment found that slowing and stopped traffic on I-290 eastbound queued back to St. Charles Road on most weekdays in the early afternoon (about the same time as the crash), and the queue lengthened to as much as 2–2.5 miles in late afternoon.<sup>1</sup> Analysis by IDOT has shown that the traffic demand exceeds the capacity of

<sup>1</sup> See Highway Attachment of IDOT Traffic Camera Recorded Views of Traffic Queues on I-290 between the St. Charles Road interchange and the I-290/I-294 interchange in the NTSB docket, [www.nts.gov](http://www.nts.gov), under accident number HWY18MH007.

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the highway and that the highway network in this area is oversaturated, which frequently results in congestion and stopped traffic. The driver of the Pioneer truck reported being familiar with the route and the frequently occurring congestion; he told investigators he had been on that roadway “hundreds” of times.

**Crash History.** Between 2011 and 2016, a total of 1,096 rear-end crashes occurred on I-290 within a 2-mile radius of this collision. Four of these crashes resulted in five fatalities, and one of them involved a heavy truck. IDOT identifies high-crash roadway segments by reviewing statewide crash data to “identify approximately 5 percent of all roadway locations within the State of Illinois with the greatest potential for safety improvement.” The IDOT process uses a 5-year period of crash data to identify locations that experience a higher severity of crashes compared to similar locations statewide. The crash site on I-290 was within 0.25 miles of one of these high-risk 5-percent segments.

### Injuries

Each of the seven vehicles involved in the crash was occupied by only the driver. Five of the drivers sustained minor injuries; the driver of the Chrysler was fatally injured. One driver was uninjured. Three of the drivers were transported to Elmhurst Hospital for treatment. The Pioneer driver declined treatment but was later taken to Elmhurst Hospital to have blood drawn for toxicology testing.

### Emergency Response

A total of 19 state, county, and local emergency service agencies responded to the crash. The first crash notifications were made to the Berkeley Fire Department and the Hillside Fire Department at 1:50 p.m. and 1:51 p.m., respectively, through the Cook County Sheriff’s Department 911 system. The first units arrived within 5 minutes of being dispatched.

The Illinois State Police, the primary law enforcement agency for the interstate, was notified at 1:57 p.m. Its first trooper did not arrive until 21 minutes later because of high traffic volumes during that time of day and the increased congestion resulting from the crash. In total, the Illinois State Police responded with 30 state troopers, including its reconstruction team. The Illinois State Police handled the crash investigation while the chief of the Berkeley Fire Department coordinated command for transporting the injured and for fire suppression and HAZMAT.

### Human Performance

The Pioneer truck was the initial striking vehicle in the collision sequence, and, because of that fact, the driver of this truck is the primary focus of the human performance discussion.

**Licensing, Certification, and Driver History.** At the time of the crash, the Pioneer driver, a 47-year-old male, held a Wisconsin class A commercial driver’s license (CDL) issued in March 2017 and scheduled to expire in March 2025. The CDL showed restrictions for corrective lenses and did not contain special endorsements. The carrier produced a driver qualification (DQ) file,

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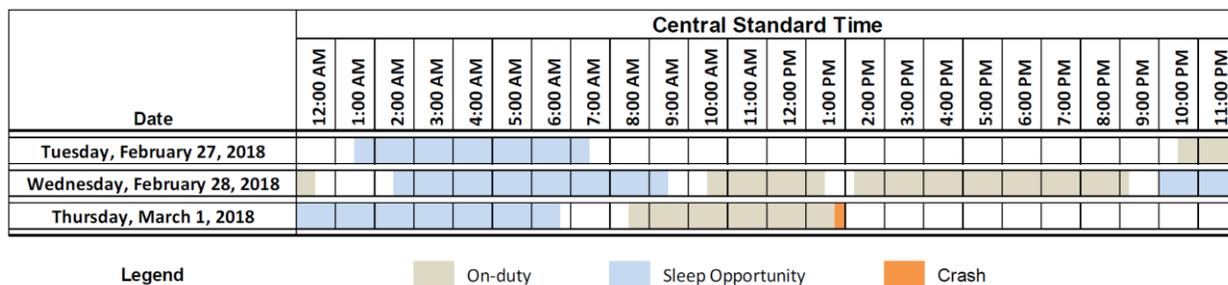
which met the regulatory requirements under 49 *Code of Federal Regulations* (CFR) Part 391. The driver’s US Department of Transportation (DOT) medical certificate was current with an issue date of October 2017 and an expiration date of October 2018. However, investigators identified anomalies with the medical certificate, which are discussed along with the driver’s medical history below.

According to carrier records, the driver began his employment with Pioneer Transportation on August 10, 2010. During the postcrash interview, the driver stated that he had worked several other driving jobs before joining Pioneer. A summary of his employment history is documented in table 1. The driver had an employment gap between 2009 and 2010 because he lost his CDL privileges for 1 year from July 22, 2009, to July 22, 2010, due to a failure to appear in court.

**Table 1.** Pioneer driver’s previous employment history.

Dates of employment	Company	Reason for leaving
Aug 2008–Jul 2009	US Xpress	License issue
Nov 2005–Jun 2008	Elite Carrier	Out-of-service violation (unknown nature)
Nov 1998–May 2005	Lincoln-Wood Products	Not stated

**Pioneer Driver’s Precrash Activities.** Investigators reconstructed the Pioneer driver’s precrash activities using his cell phone records, his vehicle’s electronic logging device, toll receipts, and his postcrash interview. The driver was off duty February 24–26. Phone records indicate that he averaged about 8 hours of sleep opportunity on the nights of the 25th and 26th. The driver had 6 hours of sleep opportunity on the morning of the 27th, 7 hours of sleep opportunity on the morning of the 28th, and 9 hours of sleep opportunity on the night of the 28th, before the crash. The driver’s sleep opportunities are shown in figure 2. The driver generally followed his sleep/wake schedule during these days, with the exception of the night before the collision, when he retired earlier and also awoke somewhat earlier than on other days.



**Figure 2.** Pioneer driver's sleep opportunities prior to the crash.

The crash occurred at a time of day when individuals can experience an afternoon circadian low and thus tiredness. Factoring in the time of day, the shift in the Pioneer driver’s sleep schedule the night before the crash, and his sleep disorder (discussed in detail below), the driver was likely fatigued at the time of the collision.

Pioneer Transportation is subject to the Federal Motor Carrier Safety Administration (FMCSA) hours of service (HOS) regulations (49 CFR Part 395). At the time of the crash, Pioneer

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Transportation was using an automatic onboard recording device to meet the FMCSA electronic logging requirements for HOS.<sup>2</sup> Investigators reviewed the Pioneer driver's logs for compliance with the HOS regulations (table 2).<sup>3</sup> No violations were identified in the 30 days preceding the crash. NTSB investigators did not find any evidence of log falsification.

**Table 2.** Pioneer driver's last 7 days of HOS before the crash, based on information from the automatic onboard recording device.

Date	Day of the week	Hours on duty
February 22, 2018	Thursday	8.52
February 23, 2018	Friday	7.14
February 24, 2018	Saturday	0
February 25, 2018	Sunday	0
February 26, 2018	Monday	0
February 27, 2018	Tuesday	1.39
February 28, 2018	Wednesday	10.27
March 1, 2018*	Thursday	~ 5.21

\* This information was also obtained by the Illinois State Police after the crash.

**Distraction.** The Pioneer driver reported using his cell phone's navigation application at the time of the crash. The phone had been positioned in a cup holder to the right of his knee, which would have required him to look down and away from the windshield to view it; however, the driver told investigators that the phone had been attached to a headpiece so that he could listen to the directions and not have to look down to view the navigation information.<sup>4</sup> Use of the global positioning system (GPS) was also noted by a witness who helped the driver turn off the navigation application when they were on the side of the road following the crash. Before the crash, the GPS application had been providing new route guidance to the driver; he had missed the exit to I-290 east while traveling on I-294 north and was rerouting from St. Charles Road to take the I-290 east exit from I-294 south just before the collision. The driver's cell phone records showed that he was not on a phone call and was not texting before the crash. It is unclear how much of a role his use of the navigation application and any associated distraction may have played in the collision.

**Medical Conditions.** When the crash occurred, the Pioneer driver had already been diagnosed with a number of medical conditions, including obstructive sleep apnea (OSA), type 2 diabetes, an episode in 2012 of severe kidney disease, hypothyroidism, obsessive compulsive disorder (OCD), high cholesterol, and morbid obesity (body mass index [BMI] = 50 kg/m<sup>2</sup>). These

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<sup>2</sup> Using automatic onboard recording devices to meet FMCSA HOS logging requirements was permitted until December 17, 2019. Now all drivers/carriers must use an electronic logging device (ELD), which records and displays more data. For more information, visit [the FMCSA website](#).

<sup>3</sup> Investigators determined that the Pioneer driver was compliant with the 11-hour, 14-hour, and 70-hour HOS regulations, which correspond to a driver being allowed to operate for 14 hours from start to stop in a given day, for a maximum 11 hours of driving during that time period, and for 70 hours in an 8-day period.

<sup>4</sup> Illinois allows hands-free use of portable electronic devices (PEDs) for most drivers; however, drivers operating under a learner's permit, drivers under the age of 19, and school bus drivers are prohibited from using PEDs while driving, whether hands-free or not. A ban against texting and handheld phone use is in place for all Illinois drivers.

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conditions may affect an individual's ability to safely operate a motor vehicle and are evaluated as part of the medical certification process for commercial motor vehicle operators. The driver's diagnosis of a sleep disorder is particularly relevant because of its association with fatigue and thereby an increased crash risk, if untreated.<sup>5</sup> OSA occurs when the musculature of the airway relaxes during sleep and obstructs the flow of air into and out of the body. When carbon dioxide levels rise as a result, the person arouses from sleep in order to breathe. These repeated disruptions interfere with restorative sleep functions and may lead to daytime somnolence, resulting in microsleep, lapses in attention and situational awareness, and performance decrements.<sup>6</sup>

The Pioneer driver was hospitalized twice in December 2011. During the second admission, one of the physicians listed OSA as a diagnosis. Supporting documentation was not provided in the record, and the driver was not discharged with a continuous positive airway pressure (CPAP) device at that time.<sup>7</sup> The driver was again hospitalized on February 7, 2012, with severe anemia and pneumonia. During this admission, he underwent a brief diagnostic study for sleep apnea that revealed an apnea-hypopnea index (AHI) of 81 episodes/hour, indicating severe sleep apnea.<sup>8</sup> Because of the results of this study, he then underwent a formal split-night study in the sleep lab to further document the problem on February 9, 2012. His repeat AHI without treatment was 6.7 episodes per hour, indicating mild sleep apnea. The driver was given a CPAP device during this sleep study that alleviated his apneas and hypopneas while in the lab. During follow-up outpatient appointments with his healthcare provider, the driver reported "getting used to it" in regard to his CPAP device and using it "most nights." However, in interviews with NTSB investigators, the driver reported not using his CPAP device beyond this hospitalization. Furthermore, investigators found no evidence that the driver obtained any refills or replacement equipment for this device.

Although sleep studies are used to diagnose OSA, numerous medically established risk factors exist for this condition, including male gender, age, obesity, hypertension, neck circumference (greater than 17 inches for men), hip circumference, and episodes of nocturnal gasping.<sup>9</sup> The relationship with obesity is particularly strong; 40–90 percent of individuals with a

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<sup>5</sup> (a) A.T. Mulgrew, G. Nasvadi, A. Butt, and others. "Risk and Severity of Motor Vehicle Crashes in Patients with Obstructive Sleep Apnea/Hypopnea." *Thorax*. 2008; 63(6):536–541. (b) O.K. Basoglu and M.S. Tasbakan. "Elevated Risk of Sleepiness-Related Motor Vehicle Accidents in Patients with Obstructive Sleep Apnea Syndrome: A Case-Control Study." *Traffic Inj Prev*. 2014; 15(5):470–6.

<sup>6</sup> (a) M.R. Rosekind, E.L. Co, K.B. Gregory, and D.L. Miller. 2000. *Crew Factors in Flight Operations XIII; A Survey of Fatigue Factors in Corporate/Executive Aviation Operations*. NASA/TM—2000-209610. (b) A. Sneddon, K. Mearns, and R. Flin. 2013. "Stress, Fatigue, Situation Awareness and Safety in Offshore Drilling Crews." *Safety Science*, vol. 56, 80–88. (c) A. Smiley and G.J. Alexander. 2016. *Human Factors in Traffic Safety*. Tucson, AZ: Lawyers & Judges Publishing Company.

<sup>7</sup> CPAP devices are commonly used to treat OSA.

<sup>8</sup> An apneic episode is the complete absence of airflow through the mouth and nose for at least 10 seconds. A hypopnea episode is when airflow decreases by 50 percent for at least 10 seconds or decreases by 30 percent if there is an associated decrease in the oxygen saturation or an arousal from sleep. The AHI sums the frequency of both types of episodes per hour. An AHI of less than 5 is considered normal. An AHI of 5–15 is mild, 15–30 is moderate, and more than 30 episodes per hour is considered severe sleep apnea.

<sup>9</sup> (a) P.E. Peppard and others. "Increased Prevalence of Sleep-Disordered Breathing in Adults." *Am J Epidemiol*. 2013; 177(9):1006–14. (b) J.C. Seidell. "Waist Circumference and Waist/Hip Ratio in Relation to All-Cause

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BMI above 40 kg/m<sup>2</sup> are reported to have moderate to severe sleep apnea.<sup>10</sup> The Pioneer driver not only had most of these risk factors, including morbid obesity, but had in fact existing official diagnoses of OSA from sleep studies. These risk factors may help medical professionals, including certified medical examiners (discussed below), identify drivers most at risk for OSA.

**Postcrash Sleep Study.** The NTSB requested that the Pioneer driver undergo a postcrash diagnostic sleep study to obtain a more up-to-date evaluation and better understanding of his sleep health. Both the driver and the carrier consented to this request, and the sleep study was conducted on October 24, 2018. The physician noted the driver’s neck circumference as 17.75 inches, his height as 5 feet 8 inches, and his weight as 325 pounds (a BMI of 49.4 kg/m<sup>2</sup>). The sleep study results indicated that the driver had poor sleep efficiency (57.6 percent) with 18 awakenings in 208 minutes of sleep. Only 17.7 percent of the sleep time was rapid eye movement (REM) sleep (normal range is 20–25 percent). The results did not meet the criteria for OSA, but the driver was diagnosed with upper airway resistance syndrome (UARS), a sleep disorder characterized by excessive daytime sleepiness and frequent awakenings during sleep due to increased respiratory effort.<sup>11</sup> UARS causes increased airway resistance during sleep but not to a level high enough to trigger apneas or hypopneas. UARS has similarity to OSA in that the increased work of breathing leads to episodes of low oxygen saturation and arousal during sleep, causing sleep fragmentation and daytime fatigue. In the Pioneer driver’s case, during the postcrash sleep study, his oxygen saturation dropped below 90 percent eight times during his sleep period, all of it during REM sleep. A majority of the medical community now considers UARS a subtype of OSA, and many of the same treatments are used to combat the conditions and improve sleep.<sup>12</sup> Some research even suggests that UARS patients have worse sleep quality and more fatigue than mild OSA patients.<sup>13</sup>

**Medical Certification.** The medical fitness of commercial motor vehicle drivers is covered under 49 CFR 391.41, which stipulates that an individual must not operate a commercial motor vehicle unless he or she meets physical qualifications. Accordingly, interstate drivers of commercial vehicles must undergo routine medical evaluation and certification. This medical evaluation process (defined in 49 CFR 391.43) includes driver self-reporting of previous medical conditions, current health, and medications. The process also includes a physical examination, including vital signs checking, vision testing, and urine dip testing by a certified medical examiner. The DOT examination is documented on Form MCA-5875, which contains two sections.<sup>14</sup>

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Mortality, Cancer and Sleep Apnea.” *Eur J Clin Nutr.* 2010; 64(1):35–41. (c) T. Young and others; Sleep Heart Health Study Research Group. “Predictors of Sleep-Disordered Breathing in Community-Dwelling Adults: The Sleep Heart Health Study.” *Arch Intern Med.* 2002; 162(8):893–900. (d) T. Young, J. Skatrud, and P.E. Peppard. “Risk Factors for Obstructive Sleep Apnea in Adults.” *JAMA.* 2004; 291(16):2013–6. (e) A.R. Schwartz and others. “Obesity and Obstructive Sleep Apnea: Pathogenic Mechanisms and Therapeutic Approaches.” *Proc Am Thorac Soc.* 2008; 5(2): 185–192.

<sup>10</sup> A.R. Schwartz and others. “Obesity and Obstructive Sleep Apnea: Pathogenic Mechanisms and Therapeutic Approaches.” *Proc Am Thorac Soc.* 2008; 5(2): 185–192.

<sup>11</sup> C. Guilleminault and others. “A Cause of Excessive Daytime Sleepiness. The Upper Airway Resistance Syndrome.” *Chest.* 1993; 104(3):781–7.

<sup>12</sup> American Academy of Sleep Medicine. *International Classification of Sleep Disorders*, 3rd ed., American Academy of Sleep Medicine, Darien, IL, 2014.

<sup>13</sup> L.B.M. De Godoy and others. “Upper Airway Resistance Syndrome Patients Have Worse Sleep Quality Compared to Mild Obstructive Sleep Apnea.” *PLoS One.* 2016; 11(5):1–12.

<sup>14</sup> Available at: <https://www.fmcsa.dot.gov/regulations/medical/medical-examination-report-form-commercial-driver-medical-certification>.

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Section 1 is filled out by the driver and requires name, address, license number, and other identifying information. This section also includes 32 health history questions that can be answered “Yes,” “No,” or “Not Sure” (see figure 3). Questions 25 and 26 specifically ask about driver sleep history. Section 1 relies heavily on drivers’ accurate and honest self-reporting of potential conditions. Section 2 of the examination report is filled out by a medical examiner and involves physically examining the drivers.

Form MCSA-5875

OMB No. 2126-0006 Expiration Date: 11/30/2021

Last Name: \_\_\_\_\_ First Name: \_\_\_\_\_ DOB: \_\_\_\_\_ Exam Date: \_\_\_\_\_

<b>DRIVER HEALTH HISTORY (continued)</b>							
Do you have or have you ever had:	Not			Not			
	Yes	No	Sure	Yes	No	Sure	
1. Head/brain injuries or illnesses (e.g., concussion)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16. Dizziness, headaches, numbness, tingling, or memory loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Seizures, epilepsy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	17. Unexplained weight loss	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Eye problems (except glasses or contacts)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18. Stroke, mini-stroke (TIA), paralysis, or weakness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Ear and/or hearing problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	19. Missing or limited use of arm, hand, finger, leg, foot, toe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Heart disease, heart attack, bypass, or other heart problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	20. Neck or back problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Pacemaker, stents, implantable devices, or other heart procedures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21. Bone, muscle, joint, or nerve problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. High blood pressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	22. Blood clots or bleeding problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. High cholesterol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	23. Cancer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Chronic (long-term) cough, shortness of breath, or other breathing problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	24. Chronic (long-term) infection or other chronic diseases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Lung disease (e.g., asthma)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	25. Sleep disorders, pauses in breathing while asleep, daytime sleepiness, loud snoring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Kidney problems, kidney stones, or pain/problems with urination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	26. Have you ever had a sleep test (e.g., sleep apnea)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Stomach, liver, or digestive problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	27. Have you ever spent a night in the hospital?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Diabetes or blood sugar problems Insulin used	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	28. Have you ever had a broken bone?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Anxiety, depression, nervousness, other mental health problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	29. Have you ever used or do you now use tobacco?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Fainting or passing out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	30. Do you currently drink alcohol?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				31. Have you used an illegal substance within the past two years?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
				32. Have you ever failed a drug test or been dependent on an illegal substance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Figure 3.** Sample driver health history questionnaire, section 1. (Source: FMCSA)

**Pioneer Driver’s Health Reporting and Medical Certifications.** As mentioned previously, the Pioneer driver had several medical issues that may have contributed to the Elmhurst crash, the most salient of which was an untreated, serious sleep-related breathing disorder. This included being diagnosed with OSA in 2012 and later with UARS during a postcrash sleep study in 2018. The driver also had diabetes, hypothyroidism, OCD, high cholesterol, and kidney issues which—although likely not causal to the crash—all required reporting in the health questionnaire.

As mentioned earlier, the driver’s DQ file showed a medical leave of absence of about 4 months at the end of 2011 and the beginning of 2012. On February 7, 2012, the Pioneer driver tried to obtain a CDL medical certificate at a Veterans Affairs health clinic. He was administered an Epworth Sleepiness Scale questionnaire, and the score suggested that he was not at risk of daytime sleepiness. Additionally, he reported not knowing if he snored and that he felt refreshed when waking. However, at that time, the driver appeared acutely ill, and the medical examiner directed the driver to a hospital for emergency evaluation, which resulted in his being admitted for an acute immune reaction (vasculitis).

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Although the Pioneer driver was diagnosed with OSA during this admission for vasculitis and acute renal failure, he did not disclose his sleep disorder in later DOT examinations. He told NTSB investigators that he believed the OSA was associated with a bout of pneumonia, which made sleeping difficult. He denied having any sleep issues following the pneumonia and also denied using a CPAP device.

The driver attempted to obtain a medical certificate from his previous medical examiner on February 14, 2012, but in light of the new health information that was revealed during his hospitalization, the medical examiner did not grant him one. The driver did receive a full 2-year medical certification from a different medical examiner a week later, on February 21, 2012.

The driver did not report the OSA or participation in a sleep study during later medical exams. During a CDL exam dated November 7, 2016, the medical examiner noted that the driver “denies any [side effects] to meds” and “any [sleep apnea] characteristics.” In October 2017, on the form for his most recent DOT examination before the crash, the driver did not report having a sleep disorder or having ever taken part in a sleep study. Ultimately, he did not report a number of his diagnoses, including his history of kidney disease, diabetes, and OSA during his CDL examinations.

**Issues with Medical Certifications of New Pro-Freight and Schneider Drivers.**

Although the New Pro-Freight and Schneider trucks were not the initiating vehicles in the collision, the drivers of these commercial vehicles also had histories of medical issues that they did not disclose on their medical certificates. The New Pro-Freight driver failed to disclose his type 2 diabetes and hypertension, and the Schneider driver failed to disclose his hypertension and other heart-related issues. In their cases, though, the conditions were controlled with medications (which were noted in their medical records), so disclosure would likely not have prohibited either driver from operating a commercial vehicle. However, their medical conditions would have limited the length of time the medical certificates were valid, to give medical examiners the opportunity to assess the drivers’ management of the diseases.

Investigators obtained archival DOT medical examination records for the New Pro-Freight driver and found that he had disclosed his history of hypertension to medical examiners in 2013 and 2014, but failed to do so in 2016, when he was seen by a different examiner. On previous occasions, when the New Pro-Freight driver disclosed his history of hypertension, he received a medical certificate that was valid for 1 year; when he did not fully disclose his health condition, he received a certificate valid for 2 years. If his new medical examiner had had access to the New Pro-Freight driver’s past DOT examination forms, the examiner would have realized that the driver was not forthcoming with his health history and would have had a more comprehensive basis from which to evaluate the driver. Furthermore, the medical examiner would have had contact information for the driver’s previous examiner in case further follow-up was deemed necessary.

**Toxicology.** Blood and urine specimens were taken from the Pioneer driver at Elmhurst Hospital and sent by the Illinois State Police to a lab for testing. The NTSB subpoenaed the remaining unused portion of the specimens and had them sent to the Federal Aviation Administration Forensic Sciences Laboratory for analysis. Fluoxetine and its metabolite norfluoxetine, as well as risperidone and its metabolite 9-hydroxyrisperidone, were identified in the blood and urine samples. This finding is consistent with medications that were prescribed for

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the driver's OCD. Because of the reported success of the medications in treating his OCD and the length of time he had taken them, it is unlikely that either the OCD or related prescribed medications impaired the driver at the time of the crash.

### **Vehicle Damage and Collision Mitigation Systems**

As shown in figure 4, the Pioneer (2016 Kenworth) truck-tractor sustained extensive damage in the collision and postcrash fire. Although this damage created challenges for evaluating the truck's mechanical systems, investigators found no issues or defects in the steering, suspension, tires and wheels, air and braking, and electrical systems that would likely have contributed to the crash. The Kenworth truck-tractor had a history of regularly scheduled preventive maintenance, which showed no recalls or warranty claims.<sup>15</sup>



**Figure 4.** Right-side view of the 2016 Kenworth truck-tractor, showing postcollision impact and fire damage.

The Kenworth truck-tractor was equipped with an engine electronic control module (ECM) capable of recording certain vehicle-related data in the event of a sudden deceleration or fast stop event. Investigators removed the ECM from the vehicle and sent it to the NTSB Recorder Laboratory for evaluation, which revealed widespread and extreme thermal damage to all internal electronic components, preventing investigators from recovering any data related to the collision event.

At the time of its manufacture, the Kenworth truck-tractor was equipped with Bendix brake components, antilocking braking, and electronic stability controls. However, the vehicle was not equipped with a collision warning or mitigation system, nor was it required to be. Although an optional collision mitigation system was available at the time of manufacturing (Bendix Wingman Advanced), that system did not have the capability to detect stopped traffic. The latest generation

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<sup>15</sup> See the Vehicle Factual Report in the NTSB docket, [www.nts.gov](http://www.nts.gov), under accident number HWY18MH007, for more information.

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of this system—Bendix Wingman Fusion—is capable of using camera, radar, and brake systems to identify stationary targets and automatically engage the brakes to assist the driver in mitigating or preventing a crash.

## **Previous NTSB Action and Discussion**

The Elmhurst crash investigation highlighted several safety issues that the NTSB has previously identified involving commercial drivers. In fact, the 2019–2020 NTSB Most Wanted List of Transportation Safety Improvements includes both “Require Medical Fitness – Screen for and Treat Obstructive Sleep Apnea” and “Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles.”<sup>16</sup> Undiagnosed or untreated OSA has contributed to the probable cause in several other highway crashes involving commercial drivers.<sup>17</sup> The Most Wanted List highlights several recommendations to address OSA, including the following two recommendations issued to the FMCSA in 2009:

### H-09-15

Implement a program to identify commercial drivers at high risk for obstructive sleep apnea and require that those drivers provide evidence through the medical certification process of having been appropriately evaluated and, if treatment is needed, effectively treated for that disorder before being granted unrestricted medical certification.

### H-09-16

Develop and disseminate guidance for commercial drivers, employers, and physicians regarding the identification and treatment of individuals at high risk of obstructive sleep apnea (OSA), emphasizing that drivers who have OSA that is effectively treated are routinely approved for continued medical certification.

On January 18, 2019, the FMCSA provided the NTSB with an update on these recommendations, explaining that the agency was unable to complete certain OSA-related actions and rulemaking because of Public Law 113-45. This law limits the FMCSA to adding or revising requirements for screening, testing, or treatment of individuals operating commercial motor vehicles for sleep disorders pursuant to a rulemaking proceeding.<sup>18</sup> The NTSB responded with disappointment at the lack of FMCSA progress on these OSA-related recommendations. As of

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<sup>16</sup> For more information about the medical fitness-related recommendations on the Most Wanted List, see [this NTSB webpage](#).

<sup>17</sup> (a) *Work Zone Collision Between a Tractor-Semitrailer and a Tennessee Highway Patrol Vehicle, Jackson, Tennessee, July 26, 2000*. NTSB/HAR-02/01 (Washington, DC: NTSB). (b) *Truck-Tractor Semitrailer Rear-End Collision Into Passenger Vehicles on Interstate 44 Near Miami, Oklahoma, June 26, 2009*. NTSB/HAR-10/02 (Washington, DC: NTSB). (c) *Motorcoach Run-Off-the-Road and Collision with Vertical Highway Signpost, Interstate 95 Southbound, New York City, New York, March 12, 2011*. NTSB/HAR-12/01 (Washington, DC: NTSB). (d) *Motorcoach Collision with Combination Vehicle After Traffic Break on Interstate 10, Palm Springs, California, October 23, 2016*. NTSB/HAR-17/04 (Washington, DC: NTSB).

<sup>18</sup> See <https://www.congress.gov/113/plaws/publ45/PLAW-113publ45.pdf>.

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May 2020, Safety Recommendation H-09-15 remains classified “Open—Unacceptable Response” and Safety Recommendation H-09-16 remains classified “Open—Acceptable Response.”

The Elmhurst investigation also highlighted the NTSB’s ongoing push for thorough medical reviews by medical examiners and an improved medical certification evaluation process for commercial vehicle drivers. It is noteworthy that the three commercial drivers involved in the crash all failed to report relevant medical conditions during their medical certifications. Most significant to the crash was the failure of the Pioneer driver to disclose his diagnosed OSA to medical examiners.

Some progress has been made on providing clearer guidance to medical examiners regarding OSA. On March 10, 2016, the FMCSA issued an advance notice of proposed rulemaking regarding OSA (81 *Federal Register* 12642). However, the FMCSA withdrew the proposed rulemaking on August 8, 2017, instead calling attention to its updated August 2016 Medical Review Board recommendations on the topic (82 *Federal Register* 37038). Those recommendations provide specific information on screening commercial drivers for OSA, including that drivers with a BMI  $\geq 40$  kg/m<sup>2</sup> be further evaluated for sleep disorders.<sup>19</sup> For drivers with a BMI between 30 and 40 kg/m<sup>2</sup>, a formal sleep evaluation is recommended if they also meet three or more additional criteria. Given the Pioneer driver’s BMI at his October 2017 DOT exam (50 kg/m<sup>2</sup>), he would have met the Medical Review Board recommendations for a sleep study referral, regardless of the absence of reported symptoms or his failure to report his previous diagnosis.

The Pioneer driver’s most recent medical examiner reported being unaware of the FMCSA’s 2016 Medical Review Board recommendations. In fact, the accessibility of these recommendations has been a recurring issue. The NTSB investigated a similar crash in Palm Springs, California, in 2016 where a 47-passenger motorcoach struck the rear of a stopped combination vehicle’s semitrailer.<sup>20</sup> Following this investigation, the NTSB made the following recommendation to the FMCSA:

H-17-49

Make the 2016 Medical Review Board/Motor Carrier Safety Advisory Committee recommendations on screening for obstructive sleep apnea (OSA) easily accessible to certified medical examiners, and instruct the examiners to use the recommendations as guidance when evaluating commercial drivers for OSA risk.

Safety Recommendation H-17-49 remains classified “Open—Acceptable Alternate Response.” As with Safety Recommendations H-09-15 and -16, the NTSB is disappointed with the FMCSA’s lack of progress in addressing OSA. The NTSB is continuing to evaluate safety issues and recommendations regarding OSA and other relevant medical conditions in commercial motor vehicle drivers.

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<sup>19</sup> See [letter](#) to FMCSA Administrator Darling from the Motor Carrier Safety Advisory Committee and Medical Review.

<sup>20</sup> [Motorcoach Collision with Combination Vehicle after Traffic Break on Interstate 10, Palm Springs, California, October 23, 2016](#). NTSB/HAR-17/04 (Washington, DC: NTSB)

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The NTSB’s Most Wanted List also recognizes the important role of collision avoidance systems in reducing traffic crashes. These technologies are already available and vehicle manufacturers should make them standard equipment for all vehicles, including commercial vehicles. In 2015, the NTSB released a Special Investigation Report titled “The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes.”<sup>21</sup> That report made several recommendations for commercial vehicles that are directly relevant to the Elmhurst crash:

H-15-5 (to the National Highway Traffic Safety Administration)

Complete, as soon as possible, the development and application of performance standards and protocols for the assessment of forward collision avoidance systems in commercial vehicles.

H-15-8 and -9 (to passenger vehicle, truck-tractor, motorcoach, and single-unit truck manufacturers)

Install forward collision avoidance systems that include, at a minimum, a forward collision warning component, as standard equipment on all new vehicles.

Once the National Highway Traffic Safety Administration publishes performance standards for autonomous emergency braking, install systems meeting those standards on all new vehicles.

All three of the above recommendations are currently classified “Open—Acceptable Response.”

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the Elmhurst, Illinois, crash was the Pioneer Transportation truck-tractor driver’s failure to respond to slow-moving traffic due to a performance decrement likely caused by fatigue associated with his untreated sleep disorder. Contributing to the crash was the lack of a robust medical certification evaluation process to identify commercial drivers at high risk for obstructive sleep apnea and to ensure adequate screening.

## **Report Date: June 15, 2020**

For additional details about this crash, visit the [NTSB public docket](#) and search for NTSB accident ID HWY18MH007.

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<sup>21</sup> *The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes*. Special Investigation Report NTSB/SIR-15/01 (Washington, DC: NTSB).

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person” (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 (49 *United States Code*, Section 1154[b]).

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