National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials
Washington, DC 20594

HWY23MH006

HUMAN PERFORMANCE

Group Chair's Factual Report

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A. CRASH

Location: Delray Beach, Palm Beach County, FL
Date: February 8, 2023
Time: 8:06 p.m. EST

B. HUMAN PERFORMANCE GROUP

Group Chair	Anne Garcia, Ph.D. Human Performance/System Safety NTSB, RPH, Washington, DC
Group Member	Patrick Mawhinney Brightline West Palm Beach, FL
Group Member	Rory Newton Federal Railroad Administration Ft. Pierce, FL

C. SUMMARY

For a summary of the crash refer to the Crash Summary report, which can be found in the NTSB docket for this investigation.

D. DETAILS OF THE INVESTIGATION

The Human Performance (HP) investigation covers two areas; (1) Rail and (2) Highway.

1.0 Human Performance - Rail Investigation.

The HP-Rail investigation focused on the behavioral, medical, operational, and environmental factors associated with the Brightline train crew, hereafter referred to as the Engineer and Conductor. Factors which potentially contributed to their performance prior to the crash are examined in the sections below. The following are

summaries of information from records and interviews. Three additional Brightline employees were working on the accident train, however they were Train Attendants who worked exclusively in hospitality positions. These employees could not access the front-end of the locomotive, could not view the tracks ahead of the train, and could not control the train's movement. Therefore, these employees were not interviewed and are not considered to be part of this investigation.

The Engineer's and Conductor's workstations are side-by-side in the front of the locomotive. (Figures 1 and 2). They have distinct duties: the Engineer is responsible for operating the locomotive and the Conductor is responsible for the entire train. The Engineer and Conductor are both authorized to stop the train, including if there is an obstruction on the track ahead of the train.

Figure 1. Photograph of an exemplary locomotive engineer working at her locomotive engineer's station, located on the right side of the locomotive cab.

Figure 1 shows - an engineer's left hand on the locomotive throttle. The engineer's right hand is on the automatic brake valve which brakes the entire train. The independent brake valve, which brakes the locomotive only, is positioned to the right of the engineer's hand, out of sight in the photograph.

Figure 1 also shows rearview camera's video displayed on the top screen on the right. This display shows side-by-side camera views looking down both sides of the train's exterior. The Positive Train Control (PTC) screen is in the center and to its right is the Aspect Display Unit for the Automatic Train Control System (working in conjunction with the signals system). The orange button on the lower left is the train's bell. This is required to be activated at every grade crossing. The black lever to the right is the train's air horn. The train's bell comes on automatically and the exterior auxiliary lights are activated when the air horn is activated (blown).

Figure 2. Photograph of an exemplary **c**onductor's station, located on the left side of the locomotive cab, showing a Brightline conductor working.

Figure 2 shows an exemplary Brightline conductor working while the train is stopped. The PTC screen in front of him is a repeat of the engineer's PTC screen. The conductor uses the VHF radio handset in the middle of the photograph to call the employee in charge, dispatcher, other trains and signal maintainers for routine and emergency situations.

1.1 Events leading up to the accident - Rail.

The locomotive engineer stated that his workday began with his normal procedure; he called the dispatcher to verify his dispatcher bulletins, took the car van[1] to the station with the conductor, performed the crew transfer, and conducted a train air brake test. His run for the day was his normal two round trips between West Palm Beach and Miami. The Engineer stated that everything went smoothly until the moments leading up to the accident. Additional information on the train crew's activities during the early part of their work shift is provided in the Rail Operations Group Factual Report

While approaching the accident grade crossing, the engineer saw what he described as "something weird"; reflectors (reflections from an object) were at the crossing. This was unusual; however, he could not discern what the reflections were coming from. The Brightline head-end video shows that no lights were illuminated on the SUV and the bright sources noted by the Engineer were determined to be from reflective surfaces[2]. The locomotive engineer stated that he then heard a radio communication from the engineer of a northbound freight train traveling past the accident grade crossing on the adjacent track, going in the opposite direction. The freight train engineer said, "car on tracks" paused a beat and repeated, "car on tracks." The inward facing video of the freight train crew shows the engineer reacting and reaching for a radio handset at 20:05:54[3].

The Brightline engineer then realized that the reflections seen at the grade crossing were on a vehicle on the track; he put the train in emergency braking and blew the horn. The Brightline train's head-end video show the SUV stopped with its headlights and rear lights off[4].

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[1] The train crew reports to work at Brightline's West Palm Beach yard. From there, they take a Brightline car van to the train station.
[2] RE Video Group Factual Report.
[3] RE Video Group Factual Report.
[4] Ibid.

The engineer stated that he could not see the vehicle on the tracks until the freight train's headlights had passed him[5]. The inward facing video shows glare from the oncoming freight locomotive's headlight. The inward facing video of the Brightline train crew shows the train crew reacting, moving levers and pushing buttons, the inside light turned on, and braking sounds were heard at 20:05:57[6].

The Brightline engineer stated he heard his conductor call "Emergency, Emergency, Emergency" on the radio. The train impacted the SUV on the tracks at 20:06:02[7]. The engineer called the dispatcher to report that they had hit a vehicle on the tracks. The inward facing video shows the train came to a stop and the train crew began calling on both a phone and the radio at 20:06:22.

Event	Time	Source
SUV, stopped in foul of tracks, is visible to freight train crew and the engineer reached for a radio handset (to call the Brightline train crew).	20:05:54	Freight train Head-End / In-Cab video
Brightline crew reacted, moved levers and pushed buttons. In-cab light is turned on and braking sounds were audible. The ditch light also turned on. (Brightline train is put into emergency braking.)	20:05:57	Brightline Head-End video Brightline In-Cab video
SUV became visible on the Brightline head-end camera. (Glare from the on-coming freight train and the nature of the camera technology precluded the SUV from being visible on the recording until this moment.)	20:05:59	Brightline Head-End video
No lights were noted illuminated on the SUV; bright sources determined to be from reflective sources.	20:06:01	Brightline Head-End video
Brightline train impacted the SUV.	20:06:02	Brightline Head-End video

Figure 3. Summary table of events leading up to the Brightline train impacting the SUV.

The conductor's recounting of the activities leading up the accident was consistent with the engineer's recount of the day.

1.2 Toxicology testing of the train crew

Post-accident toxicology testing of the train crew was not conducted by Brightline and was not required by the Federal Railroad Administration (FRA), in accordance with its Post-Accident Toxicological Testing (PATT) program, covered in

[5] More detailed information on the train crew performance leading up to the accident is in the Operations Group Factual Report, which is in the docket for this investigation.
[6] RE Video Group Factual Report
[7] RE Video Group Factual Report

49 CFR Part 219 Subpart C[8]. Exceptions from testing include the collision between railroad rolling stock/equipment and a motor vehicle or other highway conveyance at a highway-rail grade crossing unless the regulated employee violated FRA regulation or railroad operating rule which may have contributed to the accident's cause or severity. An employee must be excluded from testing if the railroad representative can immediately determine, on the basis of specific information, that the employee had no role in the cause(s) or severity of the accident/incident[9]. Delray Beach Police Department investigators interviewed the train crew immediately following the crash. According to the crash report, police investigators did not observe signs of impairment (alcohol or other drugs)[10]

1.3 Cell phone usage and distractions of the train crew

Brightline provided the NTSB with the inward-facing video recording of the train crew, which covered several minutes prior to the collision[11]. The video showed, in the moments leading up to the crash, the train crew was not using a cell phone and that they were looking forward.

1.4 Locomotive Engineer employee records

Brightline employee records were reviewed, and the following information was obtained. The Locomotive Engineer was a 36-year-old male. He began working for Brightline on September 8, 2022, as a student engineer. He received training and was certified as an Engineer on December 8, 2022. He is due for recertification prior to December 7, 2025.

The Brightline train engineer certification process includes demonstrating proficiency in operating rules, physical characteristics of the territory, knowledge of Federal Regulations Parts 217, 218, 219, 220, 225, 228, 229, 236, 238, 239, 240, 242, 270, and 272, qualifying on the territory, on-the-job training (OJT), and a review of their state motor vehicle record. Also, an exam on the operating rules of the host railway (Florida East Coast Railway (FECR)) and Brightline Special Instructions (rules and procedures that relate to passenger service) are required.

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[8] Human Performance Attachment – FRA's Post-Accident Toxicological Testing Determination Chart, effective 01-01-2023.
[9] See page three of Human Performance Attachment – FRA Post-Accident Testing Guidance revised 01-01-2023.
[10] Human Performance Attachment – Florida Crash Report
[11] Detailed information from the inward-facing video is in the RE Video Group Factual Report, which is in the docket for this investigation.

The Brightline territory at the time of the crash was Miami to West Palm Beach, FL, which is approximately 66 miles on two lines; the main line and the Port lead to the Port of Miami.

Locomotive Engineer classroom training is four weeks and covers safety, operating rules, Brightline Special Instructions, equipment, air brake and train handling and the applicable Federal Regulations. This is followed by qualifying on the territory, and OJT, which consists of five weeks of locomotive operator training between Miami and West Palm Beach. They are trained on the equipment, and air brake and train handling rules.

The engineer completed and passed his most recent medical physical on July 25, 2022, which is conducted annually, per Brightline policy[12]. The medical physical is comprised of hearing and vision tests.

There were no operating rules violations or company policy violations infractions in the Locomotive Engineer's employment files since he began employment with Brightline.

Prior to employment with Brightline, the Engineer worked at Long Island Railroad (LIRR) in Jamaica, NY, from September 10, 2018, through August 8, 2022. There were no operating rules violations in his record from LIRR.

The Engineer's work schedule is Sundays 5:05p.m. – 1:38 a.m., Monday – Wednesday 3 p.m. – 11:38 p.m., Thursday and Friday off duty, Saturdays on-call.

Day of the Week	Time on Duty	Time off Duty
Sunday	5:05 p.m.	1:38 a.m.
Monday	3:00 p.m.	11:38 p.m.
Tuesday	3:00 p.m.	11:38 p.m.
Wednesday	3:00 p.m.	11:38 p.m.
Thursday	Off	
Friday	Off	
Saturday	On-Call	

Figure 4. Table of the Brightline Engineer's work schedule.

[12] In accordance with 49 CFR Part 240.

On the day of the accident, he arrived on-duty at the West Palm Beach facility at 3:00 p.m. and began his workday. He had a job briefing with the Conductor and the Manager on Duty. He told investigators he felt fine and well rested and did not observe anything unusual in the Conductor's behavior or appearance.

1.5 Conductor Employee Records

The conductor was a 28-year-old male. Based on the conductor's employee record, he began working for Brightline on September 8, 2022, as a conductor trainee. He received training and was certified by Brightline as a Conductor on November 18, 2022. He is due for recertification prior to November 17, 2025.

The Brightline certification process includes demonstrating proficiency in operating rules, physical characteristics of the territory, knowledge of Federal Regulations Parts 217, 218, 219, 220, 225, 228, 229, 236, 238, 239, 242, 270, and 272. Additional requirements are qualifying on the physical characteristics of the territory followed by OJT, and a motor vehicle review of their state driving record. Also, a Rules Exam on the Operating Rules of the host railway (FECR) and Brightline Special Instructions (rules and procedures that relate to passenger service) are required.

Brightline classroom training is four weeks and covers safety, operating rules, Brightline Special Instructions, equipment, air brake and train handling and applicable Federal Regulations, followed by quizzes and examinations. This is followed by qualifying on the territory, and OJT which consists of two weeks of Conductor training between Miami and West Palm Beach. They are trained on the equipment and air brake and train handling rules.

The Conductor completed and passed his medical physical on September 6, 2022, which is renewed every three years until the age of 50, then annually, per Brightline policy. The medical physical is comprised of hearing and vision tests[13].

There were no operating rules violations or company policy violations since his employment with Brightline.

[13] In accordance with 49 CFR part 242.

Prior to employment with Brightline, the Conductor worked at CSX Transportation, from March 2, 2021, through April 20, 2022 in a conductor capacity. There were no operating rules violations in his record from CSX.

1.6 Work/Rest History of the Train Crew

The Engineer and Conductor provided their work schedules and their 72-hours work/rest history, which showed approximately eight hours of sleep per night. They also stated during their interviews, that they felt good and rested on the day of the accident.[14][15] As previously stated, the train crew appeared generally alert and attentive on the inward facing video recording. The RE Video Report stated that no distractions were observed on the inward-facing video, either inside or outside of the locomotive cab.

Day	Time	Event
Monday, Feb. 6, 2023	11:15 a.m.	Woke up
	12:15 p.m.	Left for work
	2:20 p.m.	Arrived at work, got dressed, did paperwork
	11:38 p.m.	Off work
	11:45 p.m. - 1:45 a.m.	Commute home
	1:45 a.m.	Arrived home, went to bed
Tuesday, Feb. 7, 2023	10:30 a.m.	Woke up
	12:30 p.m.	Left for work
	2:30 p.m.	Arrived at work, got dressed, did paperwork
	11:38 p.m.	Off work
	11:45 p.m. – 1:45 a.m.	Commute home
	1:45 a.m.	Arrived home, went to bed
Wednesday, Feb 8, 2023	10:30 a.m.	Woke up
	12:30 p.m.	Left for work

Figure 5. Work/Rest history of the Brightline Engineer.

2.0 Human Performance - Highway Investigation

2.1 Events leading up to the accident – SUV Driver

Information about the movements of the SUV leading up to the crash were obtained from a witness that was travelling west on Lindell Boulevard and stopped at a red light at the Old Dixie Highway. [16] The witness observed the SUV turn onto Lindell Boulevard towards the grade crossing from northbound Old Dixie Highway,

[14] Human Performance Attachment – Engineer's Interview Transcript
[15] Human Performance Attachment – Conductor's Interview Transcript
[16] Human Performance Attachment – Witness Interview Transcript.

under a green signal. As the SUV turned, the grade crossing protection devices activated, and the SUV stopped. A female passenger got out of the vehicle, spoke to the driver, still seated in the vehicle, then got back in. The witness stated that the passenger did not appear to be scared. The witness estimated that the SUV was stopped for about two minutes before the freight train approached. As documented in the Vehicle Factors Factual Report, a post-crash examination of the SUV indicates that when the crash occurred, the transmission was placed in park, the headlights were off, and engine was turned off.[17]

Images from the freight train outward facing video show the SUV stopped with its front tires inside the foul of the track and the gate crossing arm lowered behind the vehicle (Figure 6). The driver and passenger were both seated in the vehicle.

Figure 6. This photograph of the accident scene, captured from the freight train's outward facing video at 20:05:55, provides a northbound view of the grade crossing prior to the Brightline train's impact with the SUV on the right side of the screen. The gate arm is visible, fully lowered behind the SUV. A pedestrian is on the sidewalk behind the SUV. The headlight of the oncoming Brightline train is seen in the middle of the photograph.

2.2 Medical Information of the SUV Driver

The Human Performance Group Chair joined the Investigator in Charge and the Survival Factors Group Chair in interviewing a family member of the deceased SUV driver and passenger. The driver was an 82-year-old male and described as

[17] For more information, see the Vehicle Factors Factual Report for this investigation.

mentally sharp with no memory issues. He was described by the family member as being in good health, and his did not require a hearing aid or eyeglasses. Additionally, the family member said the driver never drank alcohol. There were no medical records obtained in this investigation pertaining to the SUV driver.

The family member had dinner with the driver and passenger about three days prior to the accident and described them as being in good spirits, happy, and enjoying an active lifestyle. The family member did not observe that the driver or passenger in this crash displayed any indications of cognitive decline. The driver had lived in the area seasonally for several years and was familiar with the area. The driver was experienced in navigating using a GPS, map, or a compass.

2.3 Toxicology testing of the SUV Driver

Post-accident toxicology testing of the SUV Driver was negative for all tested-for substances[18][19].

2.4 Driver's License History

At the time of the crash, the SUV driver held a valid Connecticut Class D driver's license.[20] His most recent license was issued in 2020 and due to expire on his birthday in 2028.[21]

2.5 Traffic Violation and Crash History

There were no traffic violation entries on the SUV driver's license record.[22] There were no records of any recent traffic crashes in a public records database or in an auto insurance claims database.

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[18] The FAA Civil Aerospace Medical Institute tested for ethanol, glucose, and drugs. Specimens are analyzed using immunoassay, chromatography, GC/MS, HPLC/MS, or GC/FTIR. Concentrations (ug/mL) at or above those in () can be determined for, but not limited to, the following drugs: amphetamines (0.010), opiates (0.010), marihuana (0.001), cocaine (0.020), phencyclidine (0.002), benzodiazepines (0.030), barbiturates (0.060), antidepressants (0.100), and antihistamines (0.020). Drugs and/or their metabolites, that are not impairing or abused, may be reported from the initial tests. See the CAMI Drug Information Web Site for additional information (http://jag.cami.jccbi.gov/toxicology/).

[19] Human Performance Attachment – SUV Driver Toxicology Results

[20] A Connecticut Class D license permits the holder to operate any non-commercial motor vehicle with a gross vehicle weight rating of less than 26,001 pounds.

[21] Human Performance Attachment – SUV Driver's License Record

[22] Connecticut driver license records retain traffic violations three years for most violations; serious violations are retained for ten years.

3.0 Environmental Factors

Global Positioning System (GPS coordinates of the crash scene were used to determine environmental conditions near the time of the crash:

Latitude: 26°25'31.18"N
Longitude: 80°40'34.01"W

3.1 Weather Data

Historical weather data from the Boca Raton Airport National Weather Service (KBCT), located about three nautical miles from the crash site, were used to document meteorological conditions. Observations for February 8, 2023, near the time of the cash are shown below in **Table 1**.

Time (CDT)	7:53 p.m.	8:53 p.m.
Temperature	75° F	75° F
Dew Point	62° F	60° F
Humidity	64%	60%
Wind Direction	E	E
Wind Speed	15 mph	16 mph
Wind Gust Speed	0 mph	0 mph
Precip. Rate	0.00 in.	0.00 in.
Conditions	mostly cloudy	mostly cloudy

3.2 Astronomical Data for February 8, 2023

Using the GPS Coordinates listed above, astronomical data for the crash site and date was obtained from the United States Naval Observatory (USNO). The astronomical data is summarized in **Table 2** below.

Event	Time
CRASH	**8:06 p.m.**
Begin civil twilight[23]	**6:37 a.m.**
Sunrise	**07:01 a.m.**
Sun Transit	**12:34 p.m.**
Sunset	**6:08 p.m.**
End civil twilight	**8:32p.m.**
Moon Set	**8:51 p.m.**
Moon Rise	**8:49 p.m.**

E. ATTACHMENTS

Human Performance Attachment -	FRA Post-Accident Toxicological Testing Determination Chart effective 01-01-2023
Human Performance Attachment –	FRA Post-Accident Testing Guidance revised 01-01-2023
Human Performance Attachment –	Florida Crash Report
Human Performance Attachment –	Engineer's Interview Transcript
Human Performance Attachment –	Conductor's Interview Transcript
Human Performance Attachment -	Witness Interview Transcript
Human Performance Attachment -	SUV Driver's Toxicology Results
Human Performance Attachment –	SUV Driver's License Record

Submitted by:

Anne Garcia, Ph.D.
Human Performance Group Chair

[23] Morning civil twilight begins when the geometric center of the sun is 6 degrees below the horizon and ends at sunrise.