National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

HWY23MH006

ONBOARD RECORDERS

Specialist's Factual Report

July 20, 2023

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A. ACCIDENT

Location: Delray Beach, Florida
Date: February 8, 2023
Time: 2006 eastern standard time (EST)
Automobile: 2015 Nissan Rogue
Train 1: Brightline Passenger Train 559
Train 2: Florida East Coast (FEC) Railway Train 802

B. ONBOARD RECORDERS SPECIALIST

Specialist: Michael Portman
Aerospace Engineer – Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

In agreement with the Investigator-In-Charge, an Onboard Recorders group was not convened, and a summary was prepared.

The NTSB Vehicle Recorder Division received the following files:

Video File #1: DR03B_CONFIDENTIAL_Locomotive Inward Video - BLF_00010100INWARD_202302082005.vdat

Video File #2: DR03A_CONFIDENTIAL_Locomotive Head-End Video - BLF_00010100FORWARD_202302082007.vdat

Video File #3: FEC 802 Inward Facing Camera.mp4

Video File #4: FEC 802 Outward Facing Camera.mp4

Data File: DR02A_CONFIDENTIAL_Locomotive Event Recorder - BLF_000101202302090837_FRA.dat

1.0 Video Files Information

Details of the video files' lengths, frame rates, and resolutions are shown in table 1. The Brightline external head-end video file contained an associated audio track which captured external noise including engine sounds, brake sounds, horns,

and bells. Neither the Brightline inward video nor the FEC video files had associated audio tracks.

The forward-facing head-end cameras were mounted to the inside of each cab, facing towards the front of the locomotive. The Brightline internal video was oriented towards the crews' faces. The FEC internal video was mounted to the ceiling of the cab and captured a wide-angle view of the cab, the crew, and the instruments.

The FEC videos had a coordinated universal time (UTC) date and time stamp overlaid on the videos. The Brightline videos were played through the manufacturer's software, which contained local time information.

Table 1. Video files descriptions.

Video Description	Start Time EST	End Time EST	Length (mm:ss)	Frame Rate (fps)	Resolution
Brightline Head-End	20:05:01	20:21:04	16:03	30	1280x720
Brightline In-Cab	20:04:56	20:21:08	16:12	10	1280x720
FEC Head-End	20:05:50	20:06:10	00:20	14.22	1908x1072
FEC In-Cab	20:05:01	20:06:35	01:34	8.03	2816x2816

2.0 Data File Information

The wheel size of 42.76 inches was embedded in the Brightline event data, as entered by the operator. The recorder data were extracted using the DAS III software. The software outputted the locomotive event recorder parameters including distance and speed. The exported data have a sampling rate of one second; therefore, the data have an accuracy of ± 1 second. Only data relevant to this event are provided in this report.

2.1 Parameters

In Appendix A, table 3 lists the parameters verified and provided in this report. Additionally, table 4 contains the unit and discrete state abbreviations for the parameters.

2.1.1 Distance Traveled

The default output for the distance traveled is the distance decreasing in time.

3.0 Timing and Correlation

Videos from the Brightline train were displayed approximately with the local eastern standard time and videos from the FEC train were displayed approximately

with UTC time. The Brightline event recorder recorded data in approximately UTC time. The UTC times were converted to local EST by subtracting 5 hours.

As no additional external source was available for time correlation, and the video and parametric data timestamps only update at 1Hz, visual cues were used to correlate the videos (specifically, the common visual cue of the two locomotives passing each other at 20:06:00), and common data elements (such as horns and bells) were used to correlate the parametric data to the views. As a result, times are presented in approximately EST and are accurate to within approximately ±1 second.

4.0 Summary of Recording Contents

Section D contains a summary of all four videos reviewed. Section E contains screenshots from the head-end videos and a plot of the Brightline locomotive event recorder data. Figure 1 shows a plot of parametric data from the Brightline locomotive event data recorder. The corresponding tabular data used to create figure 1 are provided in electronic comma separated value (CSV) format as attachment 1 to this report.

Figure 2 shows the view from the FEC head-end as it passed the stopped vehicle at 20:05:55. Figure 3 shows the view from the Brightline head-end shortly before the collision with the stopped vehicle at 20:06:01. Figure 4 shows a view from the Brightline head-end moments later, detailing the lack of illuminated lights observed on the vehicle with red arrows.

In summary, at 20:05:52 the FEC crew were noted reaching for their radios. The Brightline train was travelling at 78 miles per hour (mph) at that time. The Brightline train's electronic air brake and throttles were moved five seconds later, at 20:05:57, after having travelled 575 feet (ft). An Engineer Initiated Emergency (EIE) was recorded at 20:05:59, after having travelled 690 ft since the FEC crew were first noted reaching for their radios. Impact occurred three seconds later, at 20:06:02. The Brightline train was travelling at 76 mph at impact and had travelled 343 ft since the EIE was triggered. The train travelled a further 1,353 ft until it stopped 22 seconds later, at 20:06:24.

D. SUMMARY OF EVENTS

Table 2. Summary of recording contents.

Time EST	Observation	Source
20:04:56	The Brightline in-cab video started. The crew appeared generally alert and attentive. No mobile phone use was noted throughout the operation of the train.	Brightline In-Cab
20:05:01	The Brightline head-end video started. The train was traveling on the left main track, with the headlight on and the bell on. The headlight immediately turned off.	Brightline Head-End
20:05:01	The FEC in-cab video started. The crew appeared generally alert and attentive. No mobile phone use was noted throughout the recording.	FEC In-Cab
20:05:14	The Brightline headlight illuminated as it passed a grade crossing.	Brightline Head-End
20:05:17	The Brightline headlight turned off.	Brightline Head-End
20:05:21	The Brightline bell ceased to sound.	Brightline Head-End
20:05:50	The FEC head-end video started. The train was travelling on the left main track as it approached the accident grade crossing. No vehicles were noted moving out of the nearby intersection toward the grade crossing.	FEC Head-End
20:05:51	The Brightline train passed a signal with a green aspect.	Brightline Head-End

20:05:52	The FEC conductor reached for a radio.	FEC In-Cab
20:05:54	The Nissan Rogue became visible in the video stopped in an upcoming grade crossing. (Note: the vehicle may have been visible to the crew earlier, but glare from the illuminated train signals and the nature of the camera technology precluded the vehicle from being visible on the recording until this moment.) The FEC engineer reacted physically and reached for a radio handset.	FEC Head-End/In-Cab
20:05:55	The Brightline headlight and bell were activated.	Brightline Head-End
20:05:55	The FEC locomotive approached the collision grade crossing. Figure 2 shows a view from the FEC head-end as the locomotive passed the stopped vehicle. The crossing guard was flashing and down behind the stopped vehicle. The vehicle's front wheels were stopped approximately in line with the outside rail of the opposite track. A witness was noted behind the vehicle.	FEC Head-End
20:05:56	The FEC locomotive passed the collision grade crossing, with the vehicle visible stopped and fouling the tracks to the right.	FEC Head-End FEC In-Cab
20:05:57	The Brightline crew reacted physically and moved levers and pushed buttons. The in-cab light turned on, and braking sounds were audible. The ditch light also turned on.	Brightline Head-End Brightline In-Cab

20:05:59	The stopped vehicle became visible on the Brightline head-end camera. The Brightline horn sounded. (Note: the vehicle may have been visible to the crew earlier, but glare from the opposing FEC locomotive's headlight and the nature of the camera technology precluded the vehicle from being visible on the recording until this moment)	Brightline Head-End
20:06:00	The two locomotives passed one another.	Brightline Head-End FEC Head-End
20:06:01	Figure 3 shows a view from the Brightline head-end as the locomotive approached the stopped vehicle. Figure 4 shows another view from the Brightline head-end shortly thereafter. No lights were noted illuminated on the vehicle, with bright sources determined to be from reflective surfaces.	Brightline Head-End
20:06:02	The Brightline train impacted the stationary vehicle.	Brightline Head-End
20:06:10	The FEC head-end video ended.	FEC Head-End
20:06:24	The Brightline train came to a stop. The crew immediately began calling on both a phone and radio.	Brightline Head-End Brightline In-Cab
20:06:35	The FEC in-cab video ended.	FEC In-Cab
20:07:06	The Brightline ditch light turned off and reverted back to a normal headlight.	Brightline Head-End

20:07:17	The last passing car of the FEC consist passed the Brightline locomotive.	Brightline Head-End
20:07:52	The Brightline bell ceased sounding.	Brightline Head-End
20:21:04	The Brightline head-end video ended.	Brightline Head-End
20:21:08	The Brightline in-cab video ended.	Brightline In-Cab

E. SCREENSHOTS AND PLOTS

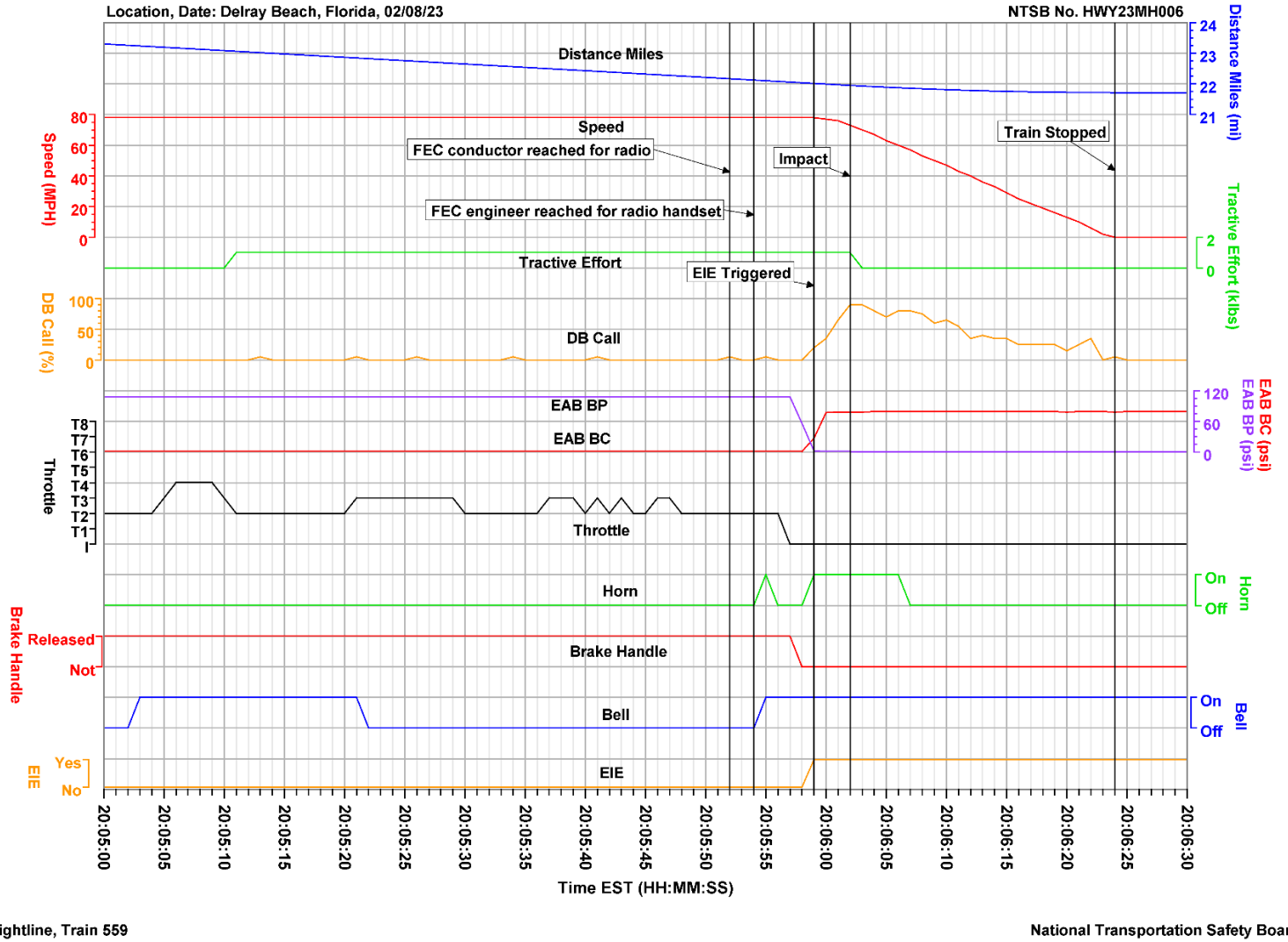

Figure 1. Plot of recorded data from Brightline train 559.

Figure 2. View from the FEC head-end as the locomotive passed the stopped vehicle at 20:05:55.

Figure 3. View from the Brightline head-end as the locomotive approached the stopped vehicle at 20:06:01.

Figure 4. View from the Brightline head-end the stopped vehicle's unilluminated lights (with red arrows) further at 20:06:01.

Submitted by:

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APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

This appendix describes the locomotive event recorder parameters provided and verified in this report for Brightline Train 559. Table 3 lists the plot labels, parameter descriptions, and units. Table 4 contains the unit and discrete state abbreviations for the parameters.

Table 3. Verified and provided locomotive event recorder parameters for Brightline 559.

Plot Label	Parameter Description	Unit
Bell	Bell	
Brake Handle	Brake Handle Position	
DB Call	Dynamic Braking Handle Position	%
Distance Feet	Distance Travelled – Feet	ft
Distance Miles	Distance Travelled – Miles	mi
EAB BC	Electronic Air Brake – Brake Cylinder Pressure	psi
EAB BP	Electronic Air Brake – Brake Pipe Pressure	psi
EIE	Engineer Initiated Emergency	
Horn	Horn	
Speed	Speed	mph
Throttle	Throttle Position	
Tractive Effort	Tractive Effort	klbs

Table 4. Unit and discrete state abbreviations.

Unit and Discrete State Abbreviation	Description
ft	feet
I	Idle
klbs	kilo pounds
mi	miles
mph	miles per hour
psi	pounds per square inch
T1	Throttle Position 1
T2	Throttle Position 2
T3	Throttle Position 3
T4	Throttle Position 4
T5	Throttle Position 5
T6	Throttle Position 6
T7	Throttle Position 7
T8	Throttle Position 8