NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

August 9, 2021

Locomotive Event Recorder

Specialist's Factual Report
By Michael Portman

1. EVENT SUMMARY

Location:	Baltimore, Maryland
Date:	February 7, 2019
Company:	Norfolk Southern
Train ID:	H63
Locomotive:	NS 9207
NTSB Number:	RRD19FR004

2. LOCOMOTIVE EVENT RECORDER GROUP

A locomotive event recorder group was not convened.

3. DETAILS OF RECORDER INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received an event recorder file from the locomotive NS 9207.

3.1. Locomotive Event Recorder Recording Description

The wheel size of the locomotive was embedded in the event recorder data. Using the wheel size of 42.26 inches, the locomotive event recorder data were extracted using the CDP 2020 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 the data relevant to this event are provided in this report.

3.2. Parameters

Table A-1 lists the parameters verified and provided in this report for NS 9207. Additionally, table A-2 contains the unit and discrete state abbreviations for the parameters.

3.3. Event Recorder Timing

The recorded time from NS 9207's locomotive event recorder data file is recorded internally. Since no other time source was available to correlate to the actual time of day, the event recorder times from NS 9207 will be used as the time base. Therefore, all times in this report and attachment are referenced as eastern standard time (EST).

3.4. Plots and Corresponding Tabular Data

Figures 1 to 2 contain locomotive event recorder data from NS 9207 recorded during the event on February 7, 2019. All the parameters listed in table A-1 were plotted except Latitude and Longitude.

Figure 1 covers the last hour of data from 06:00:00 EST to 07:00:00 EST. Figure 2 covers the 10 minutes surrounding the event from 06:50:00 EST to 07:00:00 EST.

In summary, NS 9207's event recorder data indicated the following:

- The train was engaged in several small and short maneuvers in the hours preceding the event.
- The final set of maneuvers began at 06:52:07, when the throttle was moved from idle to notch 1. Shortly thereafter, the traction motor current (TMC) increased.
- At 06:52:53, the brake cylinder pressure lowered, and the locomotive began moving shortly thereafter, reaching a maximum throttle selection of notch 3, and a maximum speed of 8 miles per hour (mph) during the maneuver.
- After reducing the throttle to idle and applying brakes, the locomotive came to a stop at 06:54:50, at which time the train direction switched from forward to reverse.
- At 06:55:29, the throttle was increased to notch 1, and the brace cylinder pressure reduced shortly thereafter.
- At 06:55:32, the throttle was increased to notch 2, and the locomotive began moving at 06:55:39.
- At 06:55:58, the throttle was increased to notch 3, and cycled between notch 2 and notch 3 until 06:56:29, at which time the throttles began to cycle between idle and notch 1.
- During this second maneuver, the locomotive reached a maximum speed of 8 mph between 06:56:18 and 06:56:33.
- At 06:57:34, the throttle was reduced from notch 1 to idle for the final time.
- At 06:57:54, brake cylinder pressure began to rise, and the locomotive slowed to a final stop at 06:58:16.
- At 06:58:20, the locomotive's direction parameter switched from reverse to forward.

All of the corresponding tabular data used to create figures 1 and 2 are provided in electronic separated value (.csv) format as attachment 1 to this factual report.

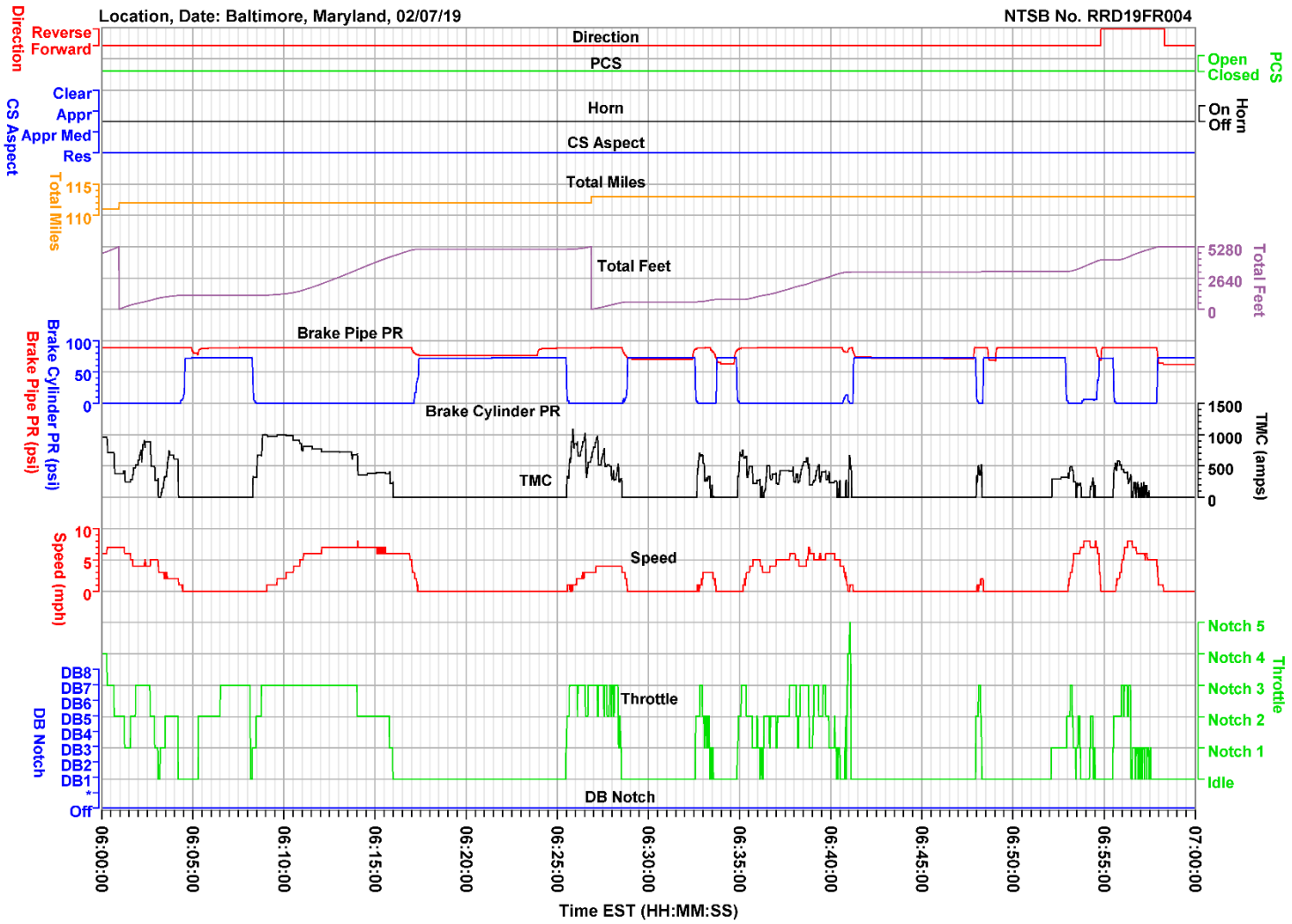

Figure 1. Overview of Locomotive Parameters for the Final Hour of Operation.

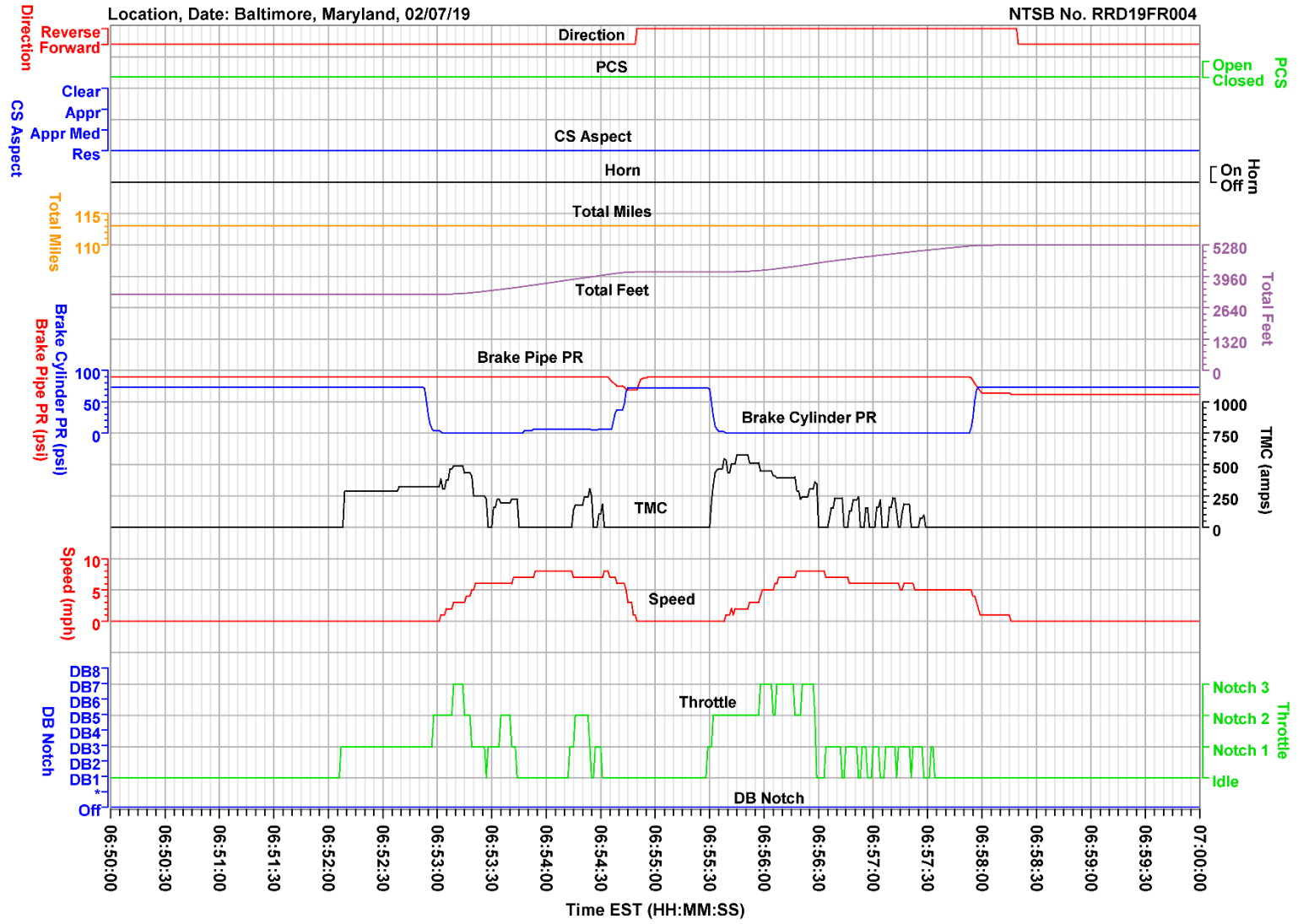

Figure 2. Detail View of the 10 Minutes Surrounding the Event.

APPENDIX A

This appendix describes the locomotive event recorder parameters provided and verified in this report for NS 9207. Table A-1 lists the plot labels, parameter descriptions, and units. Table A-2 contains the unit and discrete state abbreviations for the parameters.

Table A-1. Verified and provided locomotive event recorder parameters for NS 9207.

Plot Label	Parameter Description	Unit
Brake Cylinder PR	Brake Cylinder Pressure	psi
Brake Pipe PR	Brake Pipe Pressure	psi
CS Aspect	Cab Signal Aspect	
DB Notch	Dynamic Brake Notch	
Direction	Direction of Travel	
Horn	Horn	
LAT	Latitude Position	deg
LONG	Longitude Position	deg
PCS	Pneumatic Control Switch	
Speed	Speed	mph
Throttle	Throttle Position	
Total Feet	Feet Traveled	feet
Total Miles	Miles Traveled	miles
TMC	Traction Motor Current	amps

NOTE: Parameters with a blank unit description in table A-1 are discretes. A discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.

Table A-2. Unit and discrete state abbreviations.

Unit and Discrete Abbreviation	Description
amps	amperes
Appr	Approach
Appr Med	Approach Medium
Clear	Clear
DB1	Dynamic Brake Position 1
DB2	Dynamic Brake Position 2
DB3	Dynamic Brake Position 3
DB4	Dynamic Brake Position 4
DB5	Dynamic Brake Position 5
DB6	Dynamic Brake Position 6
DB7	Dynamic Brake Position 7
DB8	Dynamic Brake Position 8
mph	miles per hour
psi	pounds per square inch
Res	Restricting