National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials

Washington, DC 20594

RRD22MR010

OPERATIONS

Group Chair's Factual Report

January 10, 2023

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A. ACCIDENT

Type: Grade Crossing Accident
Date and Time: June 27, 2022, at 12:42 p.m. CDT
Location: Mendon, Missouri
Carrier: National Passenger Rail Corporation (Amtrak)
Train: Amtrak Passenger Train No. 4

B. OPERATIONS GROUP

Group Chair	Zach Zagata NTSB / Operations
Group Member	Michael Bachmeier NTSB / Operations
Group Member	Chris Groom, FRA Operating Practices Safety
Group Member	Dan Bonawitz SMART-TD / Investigator
Group Member	Steve Facklam BLET / Investigator
Group Member	Michael S. Cook BNSF Director of Safety
Group Member	Joe Morris Amtrak Superintendent Road Operations

C. SUMMARY

On June 27, 2022, about 12:42 p.m. local time, eastbound National Railroad Passenger Corporation (Amtrak) train 4 (also known as the Southwest Chief), carrying 271 passengers and 12 crew, derailed in Mendon, Missouri after colliding with a 2007 Kenworth W900B dump truck that was fouling a highway railroad grade crossing. Three train passengers and the truck driver died, and multiple passengers and crew were transported to local hospitals with injuries. Damage was estimated by Amtrak and BNSF Railway (BNSF) to be about $4 million.

Amtrak train 4, traveling from Los Angeles, California, to Chicago, Illinois, consisted of two locomotives and eight railcars. The collision with the fully loaded dump truck occurred at milepost 363.8 on the BNSF Marceline Subdivision near a rural passive highway railroad grade crossing on County Road 113, also known as Porche Prairie Avenue. The highway railroad grade crossing was equipped with crossbucks, and a stop sign on the right side of Porche Prairie Avenue as the dump truck driver approached from the south. All locomotives and railcars derailed with seven of the railcars coming to a rest on their sides. The dump truck received heavy damage and came to rest in a ditch northeast of the rail crossing adjacent to the road.

For summary of the accident, refer to the Accident Summary Report in the docket for this investigation

D. DETAILS OF THE INVESTIGATION

1.0 Description of BNSF Marceline Subdivision

The Marceline Subdivision extends from milepost 444.2 near Congo, MO to milepost 234.3 in Fort Madison, IA in a timetable east-west direction. The subdivision consists of mostly two main tracks. The maximum authorized timetable speed is 90 mph for passenger trains. Unless otherwise restricted[1], the maximum authorized timetable speed for freight trains is 70 mph. In the vicinity of the accident area, BNSF authorizes train movements with a centralized traffic control system. Train movements are

[1] Train speeds may be otherwise restricted due to factors such as specific speed restrictions on equipment and tons per operative brake.

coordinated by a BNSF train dispatcher located at the Dispatch Center in Fort Worth, Texas.

2.0 The Accident

On June 27, 2022, the crew for Amtrak 4-25A reported for duty at 9:00 a.m. local time, at the yard office in Kansas City, MO. The train crew consisted of a locomotive engineer, conductor, and an assistant conductor. Upon arriving at the yard office, the crew gathered their paperwork, and job briefed with the inbound crew. At 11:09 a.m., enroute to Chicago, Illinois, Amtrak 4-25A departed Kansas City, MO carrying 271 passengers and 12 crew. The train consisted of two locomotives and eight railcars. The engineer told investigators that the train ran well, and it was a good train. He stated that prior to the incident it was a busy, but a normal trip.

While enroute to the first scheduled station stop in La Plata, MO (LAP), Amtrak 4-25A was approaching a rural passive highway railroad grade crossing on County Road 113, also known as Porche Prairie Avenue, simultaneously as a dump truck approached from the south. A review of the outward facing video revealed that as the dump truck approached the crossing a dust cloud was observed behind the dump truck. The cloud remained behind the vehicle the entire time and at no point obstructed the drivers view. At approximately the whistle board the dump truck was observed approaching the crossing and the locomotive whistle was heard.
The engineer told investigators that he noticed the truck just prior to the whistle board and began blowing whistle. When asked if he thought the truck was going to make it through the crossing as it got closer, he said it was questionable.

A review of event recorder data revealed that at 12:42:36 p.m., the engineer first sounded the whistle at 89 mph for about 2.7 seconds and the train traveled around 353 feet (1,289 feet from impact). About 5/10 of a second later the engineer sounded the second whistle at 89 mph and the train traveled around 391 feet. Event recorder download data retrieved indicates the two longs were sounded at identical lengths and spacing. The duration and spacing were identical to the cadence pattern used when the whistle sequencer foot pedal is depressed. The download also revealed that after the second long whistle was sounded, the engineer made an attempt to further warn the vehicle by sounding a succession of short blasts with the whistle push button. The duration of the short blasts was 2/10, 5/10 and 2/10 of a second. The event recorder data indicated that at 12:42:44 p.m., the engineer initiated an emergency brake application at 89 mph with the throttle in notch one. It was eight seconds from the time the whistle was first sounded to when the train was placed into emergency. Based on the recorder data, since EAB Emer Type recorded in whole seconds, investigators weren't able to determine if EIE occurred before, during, or after the 5th whistle. The engineer told investigators that he placed the train into emergency as soon as he felt the potential for danger.

In the review of the outward facing video the dump truck was observed proceeding through the crossing without stopping. Investigators did not note any erratic or abnormal manipulations of the locomotive operating controls during the review of the event recorder data. No exception was taken to the engineer's performance while approaching the crossing or the amount of warning provided. The train handling methods utilized by the engineer prior to the accident were found to be consistent with normal operations for the type of equipment and circumstances.

The engineer stated he dropped to the floor just prior to impact. At 12:42:46 p.m., Amtrak 4-25A struck the fully loaded dump at 87 mph with the train in emergency and throttle in idle. A review of the audio transmissions from the BNSF dispatcher recordings revealed that at 12:42:51 p.m., with train still in motion, the engineer called out emergency, emergency, emergency over the radio, and stated that at MP 368.7 they hit a dump truck at a road crossing.

After impact, the train traveled another 1,111 feet in about 16 seconds before coming to rest at 12:43:02 p.m., The review of the BNSF dispatcher recordings also revealed that at 12:43:35 p.m., the engineer provided the dispatcher the details of the accident location. The engineer then climbed off the engine and saw the that all the cars were on the ground. He returned to the engine and informed the dispatcher to send as much emergency response as possible. Immediately following the conversation with the dispatcher, he returned to assist the crew in evacuating the passengers. The engineer entered the cars through the bottom and sides of the cars and helped passengers down from the equipment. The engineer periodically returned to engine to communicate with the dispatcher regarding the location. When asked about the emergency response, the crew stated considering all things, it went well. They said they had lots of help assisting passengers, including a group of scouts that helped the passengers as well. The crew thought local responded fairly quickly and seemed organized.

3.0 Personnel Information

Engineer

The Engineer started with Amtrak on January 2, 1992, and 27 years of experience working as an engineer for Amtrak.

A review of the engineer's training records indicated that he completed his last re-certification on January 7, 2021, and last engineer certification general knowledge exam on May 19, 2022.

A review of the engineer's discipline history indicated that the operator had not been disciplined in the last five years.

A review of the engineer's work history from 05/30/22 to 06/27/22 indicated that the operator had worked a total of 22 times in the 28 days prior to the accident.

Conductor

The conductor started with Amtrak on September 30, 2018.

A review of the conductor's training records indicated that he completed his last re-certification on November 17, 2020, and last General Code of Operating Rules – Recurrent Exam was on January 5, 2021.

A review of the conductor's work history from 05/30/22 to 06/27/22 indicated that the operator had worked a total of 24 times in the 28 days prior to the accident.

Assistant Conductor

The assistant conductor started with Amtrak on April 18, 2016.

A review of the assistant conductor's training records indicated that he completed his last re-certification on February 11, 2020, and last General Code of Operating Rules – Recurrent Exam was on November 8, 2021.

A review of the assistant conductor's work history from 05/30/22 to 06/27/22 indicated that the operator had worked a total of 21 times in the 28 days prior to the accident.

4.0 Operating Documents

The crew is governed by the General Code of Operating Rules (GCOR), Seventh Edition, effective April 1, 2020, and System Special Instructions. The Amtrak and BNSF operating rules and supplements provided are as follows:

- General Code of Operating Rules, Eighth Edition, Effective April 1, 2020
- BNSF System Safety Instructions, dated August 4, 2021
- Amtrak Service Standards Train Service & Onboard Service Employees, dated January 10, 2022
- Amtrak Employee Safety Rules, dated September 1, 2020
- General Track Bulletins

- General Notices and Order

4.1 Applicable Rules

GCOR 5.8

5.8 Bell and Whistle Signals

5.8.1 Ringing Engine Bell

Ring the engine bell under any of the following conditions:

- Before moving, except when making momentary stop and start switching movements.
- As a warning signal anytime it is necessary.
- When approaching men or equipment on or near the track.
- Approaching public crossings at grade with the engine in front start signal at the crossing sign. If no sign, or if movement begins between sign and crossing, start signal soon enough before crossing to provide warning. Continue ringing bell until the crossing is occupied.

5.8.2 Sounding Whistle

The whistle may be used at anytime as a warning regardless of any whistle prohibitions.

When other employees are working in the immediate area, sound the required whistle signal before moving.

Other forms of communications may be used in place of whistle signals, except signals (1), (7), and (8). See following chart.

The required whistle signals are illustrated by "o" for short sounds and "—" for longer sounds:

Sound		Indication
(1)	Succession of short sounds	Use when persons or livestock are on the track at other than road crossings at grade. In addition, use to warn railroad employees when an emergency exists, such as a derailment. When crews on other trains hear this signal, they must stop until it is safe to proceed.
(2)	—	When stopped: air brakes are applied, pressure equalized.
(3)	— —	Release brakes. Proceed.
(4)	o o	Acknowledgment of any signal not otherwise provided for.
(5)	o o o	When stopped: back up. Acknowledgment of hand signal to back up.
(6)	o o o o	Request for signal to be given or repeated if not understood.
(7)	— — o —	When approaching public crossings at grade with the engine in front, sound signal as follows: A. At speeds in excess of 45 MPH, start signal at or about the crossing sign but not more than 1/4 mile before the crossing. B. At speeds of 45 MPH or less, start signal at least 15 seconds, but not more than 20 seconds, before entering the crossing. C. If no crossing sign start signal at least 15 seconds, but not more than 20 seconds before entering crossing but not more than 1/4 mile before the crossing. D. If movement starts less than 1/4 mile from a crossing, signal may be sounded less than 15 seconds before the crossing when it is clearly seen traffic is not approaching the crossing, traffic is not stopped at the crossing or when crossing gates are fully lowered. Prolong or repeat signal until the engine completely occupies the crossing(s).
(8)	— o	Approaching men or equipment on or near the track, regardless of any whistle prohibitions. After this initial warning, sound whistle signal (4) intermittently until the head end of train has passed the men or equipment.

5.0 External Oversight

In June of 2020, as part of an agency restructuring, FRA transitioned eight regional leadership teams into nine Safety Management Teams to serve as the Office of Railroad Safety's main liaison with the senior leadership of the Nation's railroads. Each of the nine safety management teams is assigned to Class I railroads or a group of railroads and provides safety oversight of the respective railroad system(s). The nine-safety management teams are:

- SMT-1: Amtrak, commuter, and excursion railroads in the eastern section of the Nation.
- SMT-2: Short Line East
- SMT-3: Norfolk Southern
- SMT-4: CP/CN/CCD
- SMT-5: BNSF
- SMT-6: UP/KCS
- SMT:7: Commuter and excursion railroads in the western section of the Nation
- SMT-8: Short line railroads operating in the western section of the Nation
- SMT-9: CSX

The Safety Management Teams represent FRA with the railroads, and they communicate and coordinate with FRA's Staff Directors, Accident Analysis Branch, Audit Management Program, and other Safety Management Teams. To carry out its mission, FRA staff includes about 400 Federal safety inspectors and specialists, as well as approximately 200 state inspectors who are spread throughout the US. Safety inspectors focus primarily on five safety disciplines when conducting inspections for compliance and enforcement; those disciplines are:

- Hazardous Materials
- Motive Power and Equipment
- Operating Practices
- Signal and Train Control
- Track

6.0 Operational Testing/Internal Oversight

On November 25, 1974, the Federal Railroad Administration (FRA) provided notice of intent to move forward with the proposed rulemaking for Part 217-Railroad Operating Rules. Within Part 217, FRA codified internal oversight for railroad operations by establishing minimum requirements for railroads to conduct periodic tests and inspections to determine the extent of compliance with operating rules and timetable special instructions. Title 49 Code of Federal Regulations (CFR) Section 217.9 requires that every railroad have a written program of operational tests and inspections in effect. Employees are tested on various aspects of their job to evaluate their ability to perform their jobs correctly and their knowledge of company rules and federal regulations. This testing not only evaluates the worker's skills and overall ability to perform a task safely and correctly, it also reinforces compliance with rules.

A railroad's operational testing program on file with FRA must, at a minimum:

1. Provide for operational testing and inspection under the various operating conditions on the railroad, at various times, and at a variety of locations.

2. Address with particular emphasis those operating rules that cause or are likely to cause the most accidents or incidents, such as those accidents or incidents identified in the quarterly reviews, 6-month reviews, and annual summaries.

3. Require a minimum number of tests and inspections per year covering the requirements of 49 CFR Part 218, Subpart F.

4. Describe each type of operational test and inspection required, including the means and procedures used to carry them out.

5. State the purpose of each type of operational test and inspection.

6. State, according to operating divisions where applicable, the frequency with which each type of operational test and inspection is to be conducted.

7. Identify by name, job title, and division or system, the railroad manager who is responsible for ensuring that the program of operational tests and inspections is properly implemented.

8. Require a record of the date, time, place, and result of each operational test and inspection that was performed in accordance with the railroad's program.

9. Require a record that specifies the railroad manager that performed the operational test or observation and each employee tested.

10. Mandate a review of operational testing results and require adjustments to the program of operational tests accordingly.

11. Mandate a quarterly review when regulations require.

12. Mandate a 6-month review when regulations require.

As a result of the requirements, Amtrak conducts tests and observations of its employees in accordance with federal regulations to determine their level of compliance with railroad operating rules. NTSB investigators reviewed Amtrak's efficiency testing program and requested specific data regarding efficiency tests for the crew.

The Amtrak program contains specific information for testing officers to be used when setting up and conducting tests. Federal regulations require that each test be described in the program including the means and methods used to conduct the tests. Amtrak has established a program of operational testing which contains the required information by regulation which is needed to maintain consistency among its testing officers. A review of the efficiency testing results for the revealed the following:

From June 1, 2021, through June 30, 2022, the engineer had been observed during operational testing by 1 supervisor on 12 occasions. The supervisor recorded a total of 63 operational tests on 16 different rules. The engineer had been found to comply 62 out of the 63 times with the rules and procedures observed by the supervisor.

The conductor had been observed during operational testing by 8 supervisors on 21 occasions. The 8 supervisors recorded a total of 69 operational tests on 21 different rules. The conductor had been found to comply 68 out of the 69 times with the rules and procedures observed by the supervisors.

The assistant conductor had been observed during operational testing by 3 supervisors on 19 occasions. The 3 supervisors recorded a total of 81 operational tests on 17 different rules. The assistant conductor had been found to comply 78 out of 81 times with the rules and procedures observed by the supervisors.

7.0 The Public Grade Crossing

There are two types of grade crossings, public and private. Public grade crossings are roadways that are under the jurisdictional umbrella of a public authority. Private grade crossings are on privately owned roadways and are intended for use by the owner or by the owner's licensees and invitees. A private crossing is not intended for public use and is not maintained by a public highway authority. Private grade crossings may be governed by legal agreements between private property owners and private railroad companies. Currently, few Federal regulations pertain to the safety, operation, maintenance, or responsibility designations at private highway-rail grade crossings, although some States and local jurisdictions have assumed varying degrees of authority over them. According to the National Crossing Inventory maintained by FRA, approximately 57 percent of the reported 250,523 highway-rail grade crossings in the United States have passive warning devices (not equipped with gates). In the state of Missouri, private crossings are not required to have advance signs or other passive warning devices and are on roadways that are not maintained by public authority. The public railroad crossing involved in this accident is located on County Road 113, also known as Porche Prairie Avenue. The highway railroad grade crossing was equipped with crossbucks, and a stop sign on the right side of Porche Prairie Avenue as the dump truck driver approached from the south.

7.1 Grade Crossing Accident Data

Information obtained from the FRA safety data website indicates that approximately 212,000 highway-rail grade crossings exist on approximately 140,000 miles of track that make up the United States' railroad system.

According to FRA statistics, 2,147 highway-rail grade crossing collisions occurred in 2021. There were 236 crossing fatalities and 666 crossing injuries in 2021 across the U.S. A comprehensive review of accident data from the FRA safety data website shows that from January 1, 2020, through December 31, 2020, 783 grade crossing accidents involved a vehicle not stopping at a grade crossing. Below is a breakdown of the accidents by type of the crossing:

Highway-Rail Incident by Type of Crossing Details

		Vehicle Type						
		Motor vehicle			Other			Grand Total
		Total Incidents	Total Deaths	Total Injuries	Total Incidents	Total Deaths	Total Injuries	Total Incidents
Crossbucks	Private	9.0	0.0	2.0				9.0
	Public	112.0	5.0	43.0	3.0	0.0	0.0	115.0
Flagged by crew	Public	1.0	0.0	0.0				1.0
Flashing Lights	Private	4.0	0.0	5.0	1.0	1.0	0.0	5.0
	Public	152.0	7.0	51.0	7.0	3.0	2.0	159.0
Gates	Private	1.0	0.0	0.0				1.0
	Public	23.0	0.0	11.0				23.0
HWTS, WW, Bells	Private	1.0	0.0	0.0				1.0
	Public	4.0	0.0	0.0				4.0
Hwy. traffic sig..	Public	4.0	0.0	2.0				4.0
Not Specified	Private	108.0	7.0	26.0	5.0	1.0	3.0	113.0
	Public	162.0	11.0	60.0	7.0	2.0	3.0	169.0
Stop signs	Private	57.0	9.0	27.0	7.0	0.0	4.0	64.0
	Public	111.0	14.0	55.0	1.0	0.0	0.0	112.0
Wig wags	Public	3.0	0.0	0.0				3.0
Grand Total		752.0	53.0	282.0	31.0	7.0	12.0	783.0

Figure 4. Breakdown of grade crossing 783 accidents in US involving a driver not stopping a grade crossing by type of crossing and warning.

Submitted by:

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