



NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing

Norfolk Southern Railway general merchandise freight train 32N
derailment with subsequent hazardous material release and fires,
in East Palestine, Ohio, on February 3, 2023

GROUP	B
EXHIBIT	
7	

Agency / Organization

NTSB

Title

Track Factual Report

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



RRD23MR005

TRACK FACTUAL REPORT

Group Chair's Factual Report

February 7, 2023



TABLE OF CONTENTS

A. ACCIDENT3

B. EAST PALESTINE GROUP3

C. SUMMARY3

 1.0 FORT WAYNE LINE DESCRIPTION3

 2.0 DERAILMENT TRACK DESCRIPTION4

 2.1 Crossties4

 2.2 Rail Anchors4

 2.3 Running Rail Section4

 2.4 Rail Fasteners and Tie Plates5

 3.0 POSTACCIDENT TRACK INSPECTION5

 3.1 Point of Derailment5

 3.2 Postaccident Track Measurements8

 4.0 NS MAINLINE TRACK INSPECTIONS9

 4.1 NS Automated Track Inspections9

 4.2 NS Rail Flaw Detection Inspections10

D. TRACK FACTUAL SIGN-OFF10

A. ACCIDENT

Accident: Train derailment with hazardous Materials
Location: East Palestine, Ohio
Date: February 03, 2023
Time: 8:54 p.m. local time
Railroad: Norfolk Southern Railway
Train: Norfolk Southern Train No. 32NB101
Line: Fort Wayne Line
Track No.: Main Track 1

B. EAST PALESTINE GROUP

Group Chair Troy A. Lloyd
Track & Engineering Group Chairman
NTSB

FRA Shane Stiffler
Track Safety Specialist
Federal Railroad Administration (FRA)

FRA James Ruff
Track Safety Inspector
Federal Railroad Administration

C. SUMMARY

For a summary of this accident, refer to the *Accident Synopsis* report within this docket, RRD23MR005.

1.0 Fort Wayne Line Description

Norfolk Southern Railway (NS) owns and maintains the Fort Wayne Line. The Fort Wayne Line extends from West Pitt (milepost PC 00.00) and Crest (milepost PC 188.7) in a timetable east-west direction. The line consists of 188.7 miles of multiple main tracks (up to four tracks), with double main track territory consisting of the most track miles. The line contains 21- control points, 3- controlled interlockings, and 1- automatic interlocking. The line has one passing siding located at CP Mohican (milepost PC 157.4) that is 7,090 feet long.

The following NS Lines connect with the Fort Wayne Line:

- Conemaugh Line at CP Penn (milepost PC 1.8)
- Mon Line at Control Point Bell (milepost PC 4.8)
- Cleveland Line at Control Point Rochester (milepost PC 25.9)
- Youngstown Line at Control Point Rochester (milepost PC 25.9)
- Koppel Secondary Track at Control Point Wood (milepost PC 34.8)
- Cleveland Line at Controlled Interlocking Alliance (milepost PC 83.2)

The Fort Wayne Line is designated as an Amtrak passenger train route. Maximum authorized timetable speed is 79 mph for Amtrak passenger trains, and 60 mph for freight trains, unless otherwise permanently speed restricted to slower timetable speeds due to track physical characteristics and interlocking locations. The maximum authorized timetable speed where the derailment occurred at milepost PC 49.5 was timetable restricted to a maximum authorized speed of 50 mph passenger/50 mph freight.

Trains operating along the Fort Wayne Line are governed by Norfolk Southern Railway operating and signal rule No. 261 via proper signal indication and train dispatcher authority whereas, signal indication will be the authority for both freight and passenger trains and engines to operate in either direction on the same track under absolute block systems rules.¹

2.0 Derailment Track Description

The derailment occurred on NS's Fort Wayne Line on Main Track 1 between the James Street Railroad Crossing and the Pleasant Drive Railroad Crossing at milepost PC 49.5. This portion of the Fort Wayne Line is designated FRA track Class 4, but was permanently restricted to an NS internal maximum authorized speed of 50 passenger/50 freight.² At the time of the derailment, the train was traversing eastbound within the authorized speed in a slight left-hand 0°56' curve, with an ascending +.38% track grade, and an average 1" superelevation.

2.1 Crossties

The derailment track was constructed with standard timber crossties that measured 9" by 7" by 8"6" long. The timber crosstie center-to-center spacings averaged around 19.5". Norfolk Southern Railway track maintenance records shows that the timber crossties were installed in September 2017. Investigators determined that the timber crossties were sound, and well maintained, and took no exceptions to the timber crosstie conditions.

2.2 Rail Anchors

The timber crossties leading up to the point of derailment were fully boxed anchored at every other timber crosstie with drive-on type rail anchors to maintain the longitudinal movement of the running rails. Investigators took no exceptions to the rail anchor pattern, and observed no longitudinal movement of the running rails.

2.3 Running Rail Section

The running rail section consisted of 136-pound RE, intermediate hardness, continuous welded rail (CWR) that was manufactured in April 2016. Norfolk Southern Railway track maintenance records show that the running rails were installed in September 2017. A review of Norfolk Southern Railway rail flaw detection records shows that Main Track 1 was inspected on January

¹ Refer to the NS Fort Wayne Line Timetable located in the accident docket under RRD23MR005

² Internal maximum authorized speed means that NS has permanently restricted a segment of track to a speed limit that is below the tracks maximum authorized designed speed usually due to track physical characteristics.

16, 2023, with no defective rail findings within the derailment location. Investigators took no exceptions to the running rail conditions.

2.4 Rail Fasteners and Tie Plates

The running rails were fastened to the crossties with 6” conventional track spikes through 14” double shoulder tie plates to secure and maintain the track gauge. The track spike pattern was consistent with one rail hold cut spike on the field side of the rail, and one rail holding cut spike on the gauge side of the rail. Investigators noted that the track spikes were tightly driven, and had a full bearing within the timber crossties. Investigators took no exceptions to the rail fasteners and tie plates.

3.0 Post-accident Track Inspection

Investigators performed a walking inspection on Main Track 1 track between the Main Street Railroad Crossing (milepost PC 51.00) and Strohecker (milepost PC 49.00), which included a visual inspection of a combination hot-box detector/dragging- equipment detector (HBD-DED) located at milepost PC 49.8 (East Palestine).

Investigators noted that the track leading up to the point of derailment was well maintained and free of any track defects. The visual inspection of the combination hot-box detector/dragging-equipment detector showed no sign of broken/missing parts, and was not disturbed/effected by the derailment of the train. Investigators also noted that the derailed train cars were piled up about 400’ east of the Pleasant Drive Railroad Crossing

3.1 Point of Derailment

Investigators observed the first indications of derailment where the south wheel bearing, part of the axle, and other truck components departed from the railcar that came in contact with the top portion of the south rail. The departed wheel bearing was found by investigators some 106’ away from the point of derailment (POD), laying in a small, wooded area about 16’ away from the field side of the south running rail.

Investigators noted and photographed witness scrape markings located along the top railhead portion of the south running rail at milepost PC 49.5³. The derailment scrape markings start from the gauge corner region of the rail, and extends about 3” in the direction of the gauge face corner of the rail.⁴

Oscillation (wavy) scrape markings were also observed along the top railhead portion of the south rail starting at the point of derailment. These oscillation markings extend eastward along the top portion of the south railhead about 1,464’.⁵ Additional indications of derailment were noted along the south field side crosstie ends from where the truck frame and other components were striking the crosstie ends.

³ The south rail is also the right rail according to the direction of travel.

⁴ Indicated by the red circle in figure 1

⁵ Indicated by the black circle in figure 1

Additional wheel flange derailment markings were observed in the gauge of the track starting about 120 feet west of Pleasant Drive Railroad Crossing at milepost PC 49.2. These derailment markings were observed to the inside gauge portion of the track and run parallel with the north running rail and extend eastward to where the north derailed wheel strikes the Pleasant Drive Railroad Crossing.⁶



Figure 1- Point of derailment at MP PC 49.5

⁶ Indicated by the red circle in figure 2

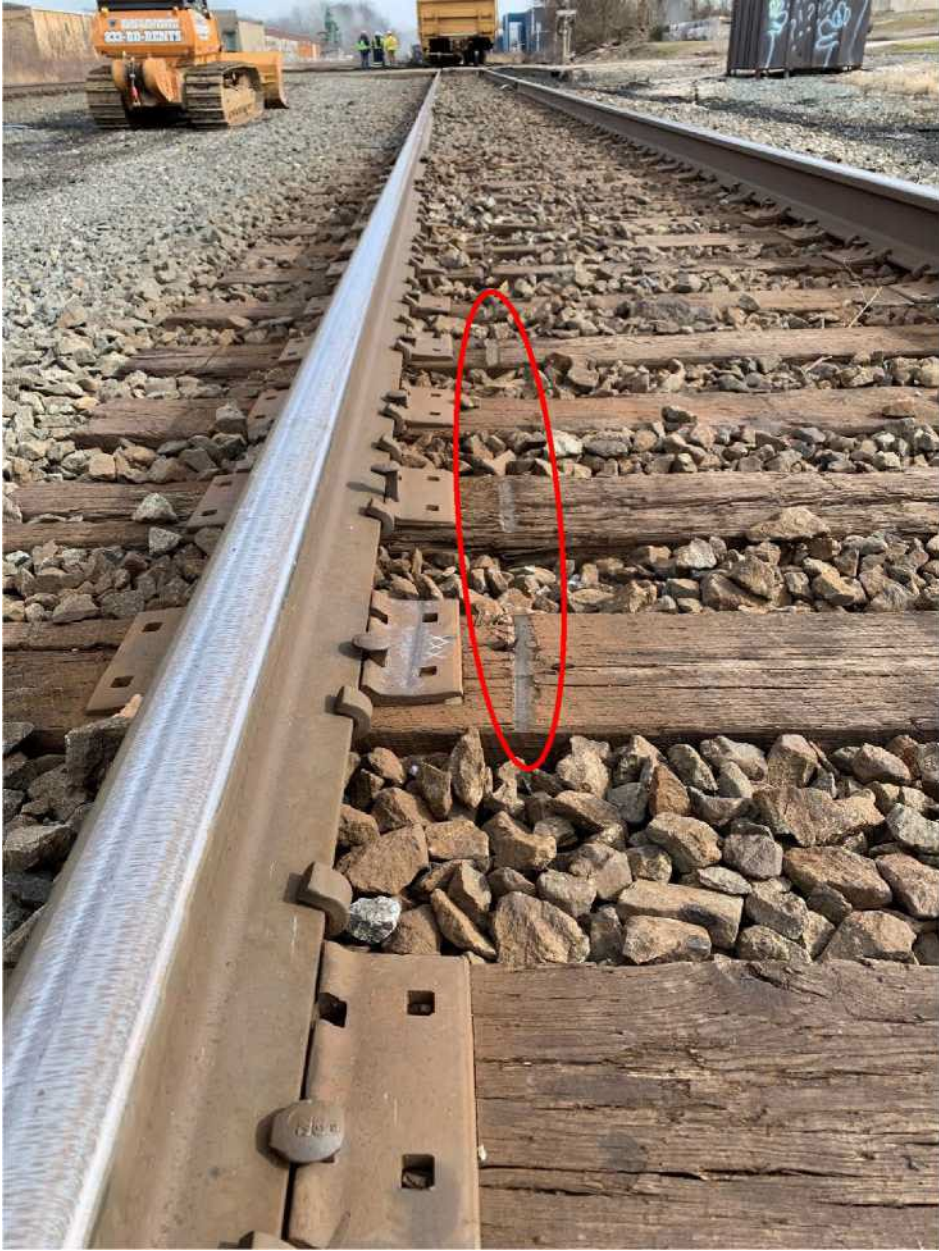


Figure 2- Wheel flange derailment markings at milepost PC 49.32



Figure 3- Final resting location of the burnt off journal.

3.2 Post-accident Track Measurements

Investigators documented post-accident track derailment measurements and notes utilizing twelve (12) track geometry stations at 15.5 foot intervals leading up to the point of derailment at milepost PC 49.5⁷. Investigators also utilized three (3) track geometry stations at 15.5 foot intervals immediately after the point of derailment location⁸. Track gauge, cross-level, and track curvature measurements were recorded at every 15.5-foot station⁹.

- Track gauge measurements averaged 56 11/16” at the measured stations. Investigators noted no lateral track movement and took no exception to tie conditions or spike and anchor patterns.
- Cross-level measurements averaged 1 %” at the measured stations. Investigators noted no additional vertical deflection and took no exceptions to the ballast conditions.

⁷ Stations are 15.5 feet apart. Postaccident track measurements are taken and recorded at each station.

⁸ The track stations immediately after the point of derailment location are shown as negative (-) stations on the postaccident measurements documents.

⁹ See the postaccident track derailment measurements in the accident docket under RRD23MR005.

- Mid-ordinate measurements to determine track curvature averaged 9/16” at the measured stations. Investigators noted no lateral track movement and took no exception to tie conditions or cut spike and rail anchor patterns.

Investigators also determined the no longitudinal rail movement was occurring along the rail base and through the drive-on type rail anchors.

A review of the post-accident track geometry measurements determined that the track was well within Norfolk Southern Railway’s engineering design standards, curve data specification, post track speed, and track profile charts.

4.0 NS Mainline Track Inspections

FRA regulations found in *49 CFR Part 213.241(b)* require that a rail carrier’s track inspection records be prepared on the day of the inspection and signed or otherwise certified for frequency of compliance with the FRA Track Safety Standards (TSS). Track inspection records are required to reflect actual field conditions and deviations from the FRA/TSS.

The two miles of track along the Fort Wayne Line between mileposts PC49.5 and PC51.5 is designated as Class 4 track. Norfolk Southern has set internal speed limits of 50 passenger/50 freight for this section of track. As specified in FRA regulation *49 CFR Part 213.233(c)*, the designation of this section of track as Class 4 track requires NS personnel to inspect the main tracks at least twice per calendar week, with a 1-day interval between track inspections.

As part of this investigation, NS track inspection records were reviewed by the track group. The review of records confirmed that NS was in compliance with FRA track inspection frequencies for FRA Class 4 track. A more comprehensive review of the records did reveal eleven administrative/reporting type defects. The group determined that the eleven administrative/reporting type defects did not affect the overall safety of NS’s track inspection/detection process.

The most recent inspections through the derailment location on Main Track 1 were conducted on January 31, 2023 and February 3, 2023. One track condition was noted between inspections at a dual controlled switch at Control Point Murph (milepost PC 73.6), where the No. 5 switch rod was broken at a bolt connection location. This condition did not affect the safe movement of trains. This places the closest reported track condition 24.1 miles west of where the point of derailment was confirmed. The track group confirmed that this condition was repaired.

4.1 NS Automated Track Inspections

FRA regulations found in *49 CFR Part 213.234(b)(1)*, require a rail carrier to perform automated inspections on FRA Class 4 and 5 main track(s), and FRA Class 3 main track(s) with regularly scheduled passenger service, at least twice annually with no less than 160 days between inspections if annual tonnage exceeds 40 million gross tons annually.

NS provided four automated track inspection reports for the Fort Wayne Line for year 2022 for the groups review. A review of the records show that the most recent automated track inspection conducted through the derailment location was performed on August 24, 2022, with no track

defects found. A review of the reports shows that NS was in compliance with FRA’s regulatory requirements for automated track inspections.

4.2 NS Rail Flaw Detection Inspections

FRA regulations found in *49 CFR Part 213.237, Inspection of Rail*, requires that a rail carrier perform a search for internal rail defects. NS provided over one year of ultrasonic rail test reports for the Fort Wayne Line. The most recent test was conducted on January 16, 2023, where four ultrasonic rail defects were discovered and coded as “NTZ” (no test). These four coded defects did not affect the safe movement of trains. A review of the reports shows that NS was in compliance with FRA’s regulatory requirements for its search for internal rail defects.

D. TRACK FACTUAL SIGN-OFF

Shane Stiffler	Track Safety Specialist	Federal Railroad Administration	
James Ruff	Track Safety Inspector	Federal Railroad Administration	