National Transportation Safety Board

Railroad Accident Brief

CSX Transportation Coal Train Derailment Killed Two Individuals

Accident No.:	DCA12MR009
Location:	Ellicott City, Maryland
Date:	August 20, 2012
Time:	11:54 p.m. eastern daylight time
Train:	CSX Transportation coal train U81318
Railroad:	CSX Transportation
Property Damage:	$1.9 million
Injuries:	0
Fatalities:	2
Type of Accident:	Derailment

The Accident

On August 20, 2012, about 11:54 p.m. eastern daylight time, an eastbound CSX Transportation (CSXT) coal train, U81318, derailed the first 21 cars at milepost (MP) 12.9 while crossing the railroad bridge over Main Street on the Old Main Line (OML) Subdivision in Ellicott City, Maryland.[1,2] The train consisted of two locomotives and 80 loaded coal cars; the train length was 4,227 feet and the weight was 9,873 trailing tons. Seven of the derailed cars fell into a public parking area that was below and north of the tracks. The remainder of the derailed cars overturned and spilled coal along the north side of the tracks. (See figure 1.)

Prior to the train crossing the bridge, two individuals entered the railroad right-of-way on the north side of the railroad bridge that crossed Main Street. They climbed over a short wooden fence and entered CSXT property without authorization to access the railroad bridge. They were sitting on the bridge during the derailment. Both individuals were killed by the spilled coal.

The CSXT train crew consisted of an engineer, a conductor, and an engineer trainee. No crewmembers were injured. At the time of the accident, the sky was cloudy and dark, the wind was calm, and the temperature was 65°F. The damage was estimated to be $1.9 million.

The CSXT train crew reported for duty at 4:00 p.m. on August 20, 2012, in Cumberland, Maryland. The train departed Cumberland eastbound toward Baltimore, Maryland.

[1] All times in this brief are eastern daylight time.
[2] In this report, all train movements and track references will refer to timetable direction.

Figure 1. Derailed train on the railroad bridge. (Photo by the Howard County Police Department)

Emergency Response

At 11:55 p.m., the first 911 call was received by the Howard County Police Department. The caller reported that a train had derailed on a bridge over Main Street in Ellicott City. Three additional 911 calls followed. About three minutes later, the initial police department units were dispatched; one minute later, fire companies from the Howard County Department of Fire and Rescue Services were dispatched, and Howard County dispatchers notified Baltimore County about the accident.[3] Police and fire personnel began arriving on scene at 12:02 a.m. on August 21. A unified command system was established with the fire and the police department officials.

Police dispatchers established direct contact with CSXT. Police officers began closing streets in the area to secure the scene. At 12:07 a.m., a fire department engine company located the train crew. Fire dispatchers contacted Baltimore Gas & Electric Company and requested that personnel respond to the scene. At 12:15 a.m., a fire department engine company located the two fatally injured individuals on the bridge.

Coal spilled from the overturned cars onto the railroad right-of-way, the street, a parking lot, and along the Patapsco River. An environmental response contractor for CSXT conducted

[3] At the accident location, the border between Howard County and Baltimore County parallels the railroad right-of-way.

water sampling and verified that no environmental impact had occurred. The Maryland Department of the Environment monitored the environmental sampling.

The Investigation

National Transportation Safety Board (NTSB) investigators interviewed the crewmembers who stated that, until the derailment, the trip was uneventful with no unusual occurrences. At the time of the accident, the three crewmembers were in the lead locomotive; the engineer trainee was operating the train. No temporary speed restrictions were in effect on the approach to Ellicott City. None of the crewmembers reported seeing any unauthorized people on the railroad right-of-way.

The crewmembers stated that the train was travelling at 24 mph when the train went into emergency braking at MP 12.8. The train had stopped in about three car lengths (or about 150 feet). The crew notified the CSXT dispatcher of the emergency braking. After the conductor exited the locomotive to inspect the train, he discovered that it had derailed. The crew stated that emergency personnel began arriving at this time. The crew provided the fire department with the train paperwork that described the train consist and advised that the train consisted of loaded coal cars.

NTSB investigators reviewed the event recorder data that indicated the train was operating at 23 mph at the time of the derailment. The authorized speed in the area of the derailment was 25 mph.

According to the Maryland Office of the Chief Medical Examiner, the cause of death for both 19-year-old individuals was compressional asphyxia. The record notes that both had been seen consuming alcoholic beverages prior to the accident. Toxicology testing was performed by the Office of the Chief Medical Examiner. In one individual, ethanol was identified in vitreous at 0.05 gm/dL. In the second individual, ethanol was 0.03 gm/dL in vitreous.

Signal and Train Control

The OML runs in a timetable east to west direction between control point (CP) St. Denis at MP 6.5 and CP Point of Rocks at MP 64.7. Train movements are governed by operating rules, timetable instructions, and signal indications from a traffic control system. A dispatcher coordinates the train movements with the signal system from the Baltimore Division operations center in Halethorpe, Maryland.

An examination of recorded signal data indicated that the crew was operating on permissive signals. No track anomalies existed that would have either disrupted the track circuit or resulted in an alert being sent to the operations center.

Wreckage Description

The two locomotives did not derail. The first car behind the locomotive pitched and rolled (that is, all wheels were off the track) about 45 degrees to the north. The next nine cars overturned to the north of the track. Car 11 decoupled from car 10. Cars 11 through 17 derailed and fell into the public parking lot that was below the tracks. Cars 18 through 20 overturned. The leading two axles on car 21 derailed, while the trailing two axles were still on the rail. The leading end of car 21 was buried 3 to 4 feet into the ballast.

The rail under the derailed cars was destroyed. Some sections of the broken rail had indications of overstress fractures that are characterized by a shiny, granular appearance with sharp edges around the freshly exposed metal. In addition, a section of broken rail that was found under car 21, had the appearance of recent longitudinal loading at the exposed edge of the rail head that is consistent with wheel tread impacts.[4,5]

Equipment

Locomotives

NTSB investigators mechanically inspected the two locomotives; no anomalies were identified. The review of the maintenance and the inspection records for both locomotives indicated that all required Federal Railroad Administration (FRA) and CSXT mechanical inspections were current, and no defect was recorded.

Non-Derailed Cars

The 59 non-derailed cars were uncoupled from the train at the derailment site on August 21, 2012. The NTSB investigators observed an airbrake test and mechanically inspected the cars. The brakes on the 59 cars applied and released as designed. No anomalies were identified with this equipment.

Derailed Cars

At the accident scene, NTSB investigators examined the first 10 derailed cars. No anomalies were identified with the conditions of either the brake rigging or the side bearing plates on the cars; all appeared to have normal contact wear patterns. The side frames, bolsters, and wheels were examined; no abnormal conditions were observed. Wheels from the cars that traveled over the north rail were observed to have witness marks in the tread that was perpendicular to the running surface. Progressing from car 1 to car 10, the witness marks increased in size and depth.

Wheel and axle assemblies were recovered from cars 11 through 20 for examination. Investigators identified and documented all wheels by serial number, using information from CSXT that allowed loose wheel sets to be matched up with the car on which they were installed. No wheel defects were noted.

Investigators noted that many of the examined wheels had witness marks that were similar to those found on cars 1 through 10. Investigators positioned the wheels from the 12th car (CSXT 302724) as the wheels would have been while traveling through the derailment area. (See figure 2.)

[4] The *rail head* is the top portion of the rail, which provides a running surface for the wheel tread and a side surface against which the wheel flange contacts.

[5] The *tread* is the slightly tapered exterior running surface of the wheel that comes in contact with the top surface of the rail.

Figure 2. Wheel sets from car CSXT 302724.

On close examination, investigators observed several perpendicular strike marks in the wheel tread of the third set of wheels that indicates a track-related defect. These marks were the first to have a pattern of successive impacts that were about 3 inches apart. (Marks were not found on the wheels of first and second set of axles.) In addition, a corresponding mark, or a mark on the adjacent wheel in the same horizontal plane of reference, was observed on the L3 wheel (the second wheel on the right side of the car in the direction of travel), located on the outside rim of the wheel.

Track and Engineering

The track between MP 9.7 and MP 20.0 is single main track. This line is the oldest common carrier railroad in the United States; it was formerly known as the Baltimore and Ohio Railroad. CSXT inspects and maintains the track in the vicinity of Ellicott City between MP 18.0 and MP 12.7 in accordance with FRA track safety standards for class 2 and 3 track, which has a maximum operating speed of 40 mph.[6] The accident occurred in a curve that has a restricted speed of 25 mph; the authorized operating speed on either side of the curve was permanently restricted to 30 mph. During an average day, 10 trains operate on the OML Subdivision. This

[6] Track safety standards are defined in 49 *Code of Federal Regulations*, Part 213, §213.9 Classes of Track Operating Speeds.

amounts to about 33.70 million gross ton-miles (MGT) annually for the area of the derailment site.[7]

In the rail preceding the damaged track (west end), NTSB investigators found field welds and recently installed sections of rail.[8] The CSXT roadmaster stated during an interview with NTSB investigators that routine maintenance was completed in May 2012 on the track in the Ellicott City area.

At the derailment site, investigators noted no rail movement and no exceptions to the anchoring pattern or rail restraint effectiveness. Investigators did observe mud at some track locations; this indicates that water drainage was not optimal.

Rail Examination

Over 2 days, investigators recovered rail pieces from the derailment area and reassembled them along the north side of the right-of-way to the west of the point of derailment. Investigators inventoried, measured, and documented each piece that was recovered.

The south rail was not broken and remained upright on the crossties for most of the derailment area. The only piece used in the rail rebuild was a section that showed a loss of normal wheel/rail relationship that was directly opposite of the north rail rebuild location. This section of the south rail was under the last derailed car (that is, the 21st car).

Investigators pieced together and examined the recovered rail. The entire south rail was reconstructed. While reconstructing the west portion of the north rail, investigators found that about 5 inches of rail were missing (and could not be located in the derailment debris). Based on the inspection data for July and August 2012, investigators estimated that the length of rail from the west end of piece N1 to the location of the repaired defect in N19 was about 17 feet 1 inch (205 inches).

At the accident scene on August 23, 2012, investigators examined the reconstructed rail and the fracture faces. Six rail sections and several other smaller rail pieces were sent to the NTSB materials laboratory for further examination. The laboratory examinations verified that 5 inches of rail were missing. (See figures 3 and 4.) The 17 feet 1 inch of rail exhibited several detail fractures; the largest was about 24 percent of the existing rail head cross section.

[7] *Gross ton-miles* are a measure of transportation, being the movement of the combined weight of cars and lading a distance of 1 mile.

[8] A *field weld* is a weld joining two rails together after rails are installed in track.

Figure 3. View of rail rebuild.

Figure 4. Cross-sectional view of a severe wheel flange strike mark on the head of a broken rail.

Table 1 lists the measurements conducted in the NTSB Materials Laboratory.

Rail Piece	Length (inches)
N1	88.75
Missing length*	5.0
N5	20.25
N15B	6.625
N16B	9.25
N17B	11.125
N18	40.75**
N19B (west end to break within joint bars)	25.0
Total	**206.75**

Table 1. ***The missing length between N1 and N5 was determined based on the missing length within the identification stencil on pieces N1 and N5.**

****The length of N18 includes missing material due to end batter at the west end as determined using the mating fracture on piece N17B.

NTSB investigators reviewed the track inspection data and examined rail pieces. Investigators measured transverse defects in the fracture faces.[9] Table 2 shows a comparison of the defect size of the remaining rail head to (1) the remaining head area (percentage), and (2) the original head area (percentage).

Fracture Surface	Defect Size Relative to Remaining Head Area (percent)	Defect Size Relative to Original Head Area (percent)
N1 east end	9	5
N5 west end	24[a]	14
N5 east end	10	6
N15 east end/N16 west end	2	1
N16 east end/N17 west end	<1	<1
N18 east end/N19 west end	1	<1
N19 east end/N20 west end	15	9

Table 2. Summary of defect size measurements.

[9] A *transverse defect* is a type of fatigue that has developed in a plane transverse to the cross-sectional area of the rail head. Development can be normal or in multiple stages before failure. The transverse defect is identified only by the nondestructive inspection process, unless the defect has progressed to the rail running surface and has cracked out.

[a]CSXT engineering personnel met with the NTSB in Washington, DC, in July 2013 to review the data and the images associated with the 24-percent transverse defect. CSXT did not agree to the 24-percent number; CSXT stated that because of the rail end batter and the rubbing that had occurred in the accident, a size could not be determined.

CSXT Inspection and Maintenance of the OML Subdivision

The frequency and applicable classes of track for which internal rail flaw detection is conducted is described in 49 *Code of Federal Regulations*, Part 213:

§ 213.237 Inspection of rail

> (a) In addition to the track inspections required by §213.233, a continuous search for internal defects shall be made of all rail in Classes 4 through 5 track, and Class 3 track over which passenger trains operate, at least once every 40 million gross tons (MGT) or once a year, whichever interval is shorter. On Class 3 track over which passenger trains do not operate such a search shall be made at least once every 30 MGT or once a year, whichever interval is longer. ** [This paragraph (a) is effective January 1, 1999.]

Based on the annual tonnage figures for the OML Subdivision, CSXT was required to test the rail for internal defects once per year. Although regulations require a search for internal rail flaws once per year for Class 3 track, which has a maximum authorized speed of 40 mph, the regulations do not require the testing of a permanent speed-restricted 25-mph curve.

CSXT was aware of the history of rail defects on the OML Subdivision and of the increase in tonnage due to a rise in coal traffic over the previous years. CSXT retained a consulting firm to recommend the ultrasonic rail detection intervals. The consultants recommended that CSXT test the OML Subdivision every 30 days. CSXT adopted this recommendation in 2009. The records provided by CSXT documented that ultrasonic testing of the OML Subdivision occurred 11 to 12 times per year, beginning in August 2010—a frequency that is 12 times greater than required by regulations. Investigators reviewed the CSXT geometry test data, ultrasonic records, and test frequency. No anomalies were noted.

CSXT Geometry Test Vehicle Data

On August 6, 2012, CSXT operated a geometry vehicle to measure the track. This test began at CP Point of Rocks and continued eastward to CP St. Denis. The data recorded the location of defects from each MP in a descending manner. Below are the track or geometry conditions recorded by the test vehicle near the point of derailment:

- A warp condition in a curve at MP 12.92 that measured 1.28 inches;
- A wide gage condition in a curve at MP 12.92 that measured 1.18 inches; and
- A wide gage condition in a curve at MP 12.76 that measured 1.17 inches.

FRA Geometry Test Vehicle Data

The FRA operated the Automated Track Inspection Program geometry vehicle, T-217, over the OML Subdivision on July 17, 2012. The FRA data showed no recorded defects for that test, including in the vicinity of the derailment.

Sperry Reports Review

Investigators reviewed the ultrasonic internal rail test data conducted on the OML Subdivision for the three most recent tests. The last test before the derailment, which was conducted on August 3, 2012, included 15.20 miles from MP 21.7 to MP 6.5. During this internal rail flaw inspection, no defective rails were marked near the derailment area. However, the nearest rail defect east of the derailment was located at MP 9.908 and was coded as a 40-percent transverse detail fracture. The nearest rail defect or condition recorded west of the derailment was located at MP 14.749; it was coded as a spall, shell, or corrugation defect.

On August 3, 2012, ultrasonic testing was conducted from MP 21.7 to MP 6.5. In the area of the derailment, no defects were recorded. The closest defect was a 40-percent transverse detail fracture at MP 9.908.

On July 6, 2012, ultrasonic testing was conducted from MP 20.1 to MP 10.9. Two defects were recorded in the area of the derailment. These defects included a 100-percent transverse detail fracture at MP 12.903 and a 40-percent transverse detail fracture at MMP 12.395. A spall, shell, or corrugation defect at MP 12.303 also was recorded.

On June 5, 2012, ultrasonic testing was conducted from MP 21.8 to MP 6.60. One defect was recorded in the area of the derailment. A spall, shell, or corrugation defect was recorded at MP 12.299; the next closest defect was a 9-percent transverse detail fracture at MP 11.034.

Postaccident Rail Defect Data

Investigators requested and received the rail defect data and the service rail failure report data from CSXT. Tables 3 and 4 show the annual inspection details (from 2008 to the test just before the derailment). A test cycle is representative of multiple test dates to cover the OML Subdivision. In table 3, the transverse detail fracture type defects for the OML are listed in the fourth column; the fifth column shows the number of transverse detail fractures that were located in curves. The last sixth and seventh columns show the number of service rail failures that occurred and were reported on the OML Subdivision and the Baltimore Division, respectively.

Year	Test Cycles	Total Defects OML	Transverse Detail Defects OML	Transverse Detail Defects in Curves	Service Rail Failures OML	Service Rail Failures Baltimore Division	MGT Annual Tonnage
2007							44.34
2008	6	106	57	28	18	137	51.91
2009	7	124	86	48	12	87	58.36
2010	6	95	67	44	3	77	47.00
2011	11	145	86	51	14	55	36.23
2012	8	91	44	21	6	32	31.02

Table 3. Sperry rail flaw detection data and annual tonnage.

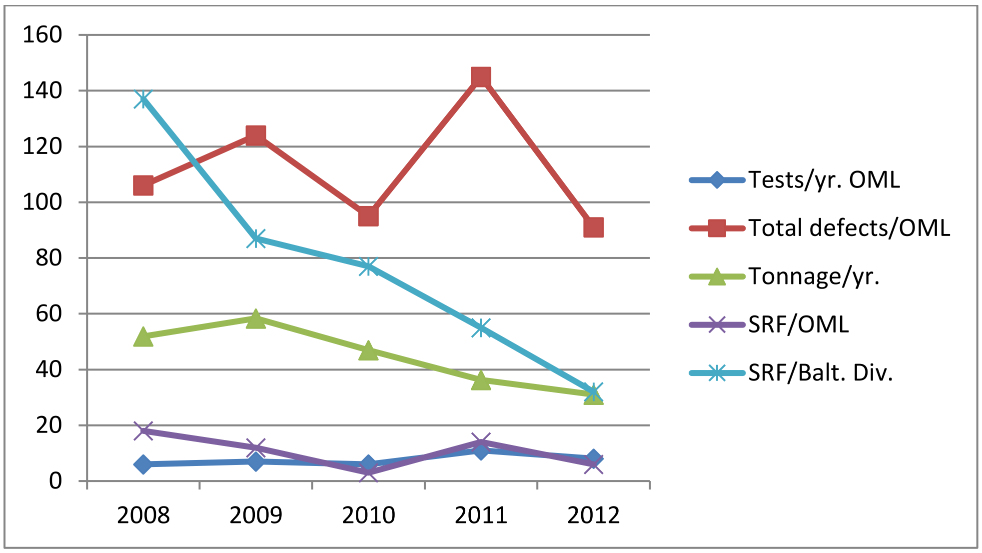

Table 4. Annual tonnage data, internal rail flaw detection tests, defect numbers, and service rail failures for Old Main Line Subdivision and Baltimore Division.

At the point of derailment, the rail fractured due to a detail fracture that initiated from head checks in the gage corner of the rail head. The leaving- and receiving-rail end deformation and batter patterns indicate that the primary fracture occurred at one of the ends of rail piece N5.[10,11] The relatively rough fracture features near the boundary of the detail fracture at the west end of piece N5, the larger size of the defect at that end, indicate that the defect at the west end of piece N5 was approaching critical size and was likely the first defect to cause a rail fracture.

Material properties did not appear to be a significant factor in the failure. NTSB investigators determined that the defect extended across just 24 percent of the remaining head area, compared to other cases where it extended from 70 to 80 percent of the remaining head area, which indicates the stresses on the rail were relatively high at the time of failure. The high

[10] A *head check* is a rail defect consisting of shallow surface or hairline cracks that appear in the gage corner of the rail head.

[11] The *gage corner* is the smaller upper rail head radius region that makes contact with the flange of a wheel.

stresses mainly resulted from a worn rail head that was approaching levels for scheduled replacement. There was also an increase in tonnage over this CSX subdivision in previous years, resulting in high axle loads. These conditions produce defects that can grow relatively quickly and can fail at a relatively small size.

Previous NTSB Investigations

On October 20, 2006, a Norfolk Southern Railway Company train en route from Illinois to New Jersey derailed because of a broken rail while crossing a railroad bridge in New Brighton, Pennsylvania.[12] The NTSB issued three safety recommendations, R-08-9, R-08-10, and R-08-11, to the FRA to address ultrasonic rail inspection and rail defect management, and to oversee internal rail inspection process and requirements. The recommendations were meant to address underlying rail conditions brought on by rolling contact fatigue.

> Review all railroads' internal rail defect detection procedures and require changes to those procedures as necessary to eliminate exceptions to the requirements for an uninterrupted, continuous search for rail defects. (R-08-9)
>
> Require railroads to develop rail inspection and maintenance programs based on damage-tolerance principles, and approve those programs. Include in the requirements that railroads demonstrate how their programs will identify and remove internal defects before they reach critical size and result in catastrophic rail failures. Each program should take into account, at a minimum, accumulated tonnage, track geometry, rail surface conditions, rail head wear, rail steel specifications, track support, residual stresses in the rail, rail defect growth rates, and temperature differentials. (R-08-10)
>
> Require that railroads use methods that accurately measure rail head wear to ensure that deformation of the head does not affect the accuracy of the measurements. (R-08-11)

The NTSB investigated the July 11, 2012, derailment in Columbus, Ohio, involving release of hazardous materials. Although this investigation is still ongoing as of the date of this report, preliminary findings indicate a broken rail with evidence of rolling contact fatigue in the curve at the accident site.

The rail failure discovered in the Ellicott City investigation has many similarities to the New Brighton, Pennsylvania, and the Columbus, Ohio, accidents, where rail with similar wear conditions failed due to detail fractures from shelling, resulting from rolling contact fatigue.

The New Brighton investigation revealed that the defect grew to 78 percent of the remaining head area, and the Columbus investigation revealed that the defect grew to 70 percent. These percentages indicate that rail stress was likely lower in those accidents than in the Ellicott City derailment.

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[12] For more information, see *Derailment of Norfolk Southern Railway Company Train 68QB119 with Release of Hazardous Materials and Fire, New Brighton, Pennsylvania, October 20, 2006.* Railroad/Hazardous Materials Report NTSB/RAR-08/02 (Washington, DC: NTSB 2008).

Rail Safety Advisory Committee (RSAC) Rail Failure Working Group Recommendations

As a result of the NTSB safety recommendations from the New Brighton investigation (and following the NTSB investigations into the Columbus and Ellicott City derailments), the FRA determined that each of the accidents resulted from rail failures. In September 2012, the FRA established a Rail Safety Advisory Committee (RSAC) Rail Failure Working Group to study the effects of rail head wear and resulting rail surface conditions (better known as rolling contact fatigue), and how such rail conditions can adversely affect the results of ultrasonic rail testing. (See Appendix A.)

The Rail Failure Working Group met four times between January and July 2013. The group proposed new performance-based recommendations for determining rail wear and internal rail inspection criteria. These criteria solidified the FRA ability to effectively monitor rail integrity programs that will likely ensure that track owners quickly identify and promptly and effectively remediate areas that could lead to a derailment in populated areas and in track transporting passengers or hazardous materials. The FRA efforts and industry acceptance of these best practices should significantly reduce broken rail accidents due to rolling contact fatigue and provide improvements for better management of the industry's rail risk management programs.

On April 16, 2014, the RSAC adopted the recommendations from the Rail Failure Working Group. The final recommendations, which were developed with industry consensus, are in Appendix B.

Postaccident Actions

After the accident, CSXT installed a chain-link fence along the right-of-way in an attempt to deter future trespassing. (See figure 5).

Figure 5. The chain-link fence installed along the railroad right-of-way to deter trespassing.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the Ellicott City derailment was a broken rail stemming from an undetected internal defect which grew to a catastrophic failure due to the combination of a worn rail head that was approaching levels for scheduled replacement and high axle loads.

For more details about this accident, visit www.ntsb.gov/investigations/dms.html and search for NTSB accident ID DCA12MR009.

Adopted: July 31, 2014

On July 1, 2016, Mr. Mark J. Mayr submitted a petition for reconsideration of the accident report, the issuance of safety recommendations, and modification of the NTSB's probable cause. The NTSB reviewed the petitioner's request and revised the report and probable cause.

REVISED BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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Adopted: August 9, 2017

CORRECTED COPY

Appendix A

US Department of Transportation

Federal Railroad Administration

Task No.: 12-01 Railroad Safety Advisory Committee Task Statement: Rail Failure Working Group

Date initially presented to the RSAC: September 27, 2012

Purpose: To consider specific improvements to the Track Safety Standards (TSS) or other responsive actions designed to monitor rail life and reduce the adverse risks of rail failures.

Background: Under Task No. 08-03, the Track Standards Working Group recently addressed the effect of rail head wear, surface conditions and other relevant factors on the acquisition and interpretation of internal rail flaw test results.

Description: Review and understand:

- Railroad engineering instructions concerning rail performance management.
- The factors that influence rail life.
- The impact of train dynamics on rail.
- The effects of head wear on rail strength and structural integrity.
- The effects of rolling contact fatigue on rail and how it can impact rail defect development.

Issues requiring specific report:

- Determine whether current industry rail head wear management systems are adequate or should be standardized.
- Identify an approach to establish the state of understanding of issues related to rail performance utilizing known experts in the field of rail research. Determine methods to improve the effectiveness and efficiency of rail performance management and rail life extension, and provide recommendations as necessary.
- Specifically, determine whether, and if so how, rail life and performance management can be improved to reduce the rate of worn-rail failures and related derailments.
- Determine whether new approaches to rail head wear limits should be developed and/or formally standardized.
- Evaluate whether methods for non-destructive rail inspections can be improved in terms of inspection effectiveness and efficiency.

Establish following working group: Rail Failure Working Group

Target Dates: Report recommendations to the Committee by March 2014.

Disposition: Accepted **Accepted Date:** September 27, 2012

Appendix B

RSAC, Rail Failure Working Group Recommendation and FRA Guidance Document

NTSB investigators coordinated with the Federal Railroad Administration in tasking the Railroad Safety Advisory Committee Rail Failure Working Group, and contributed to the final recommendations to enhance track maintenance and reduce rolling contact fatigue.

The Rail Failure Working Group was tasked on September 27, 2012, to consider improvements to the Track Safety Standards or other responsive actions designed to monitor rail life and reduce the adverse risks of rail failures. The Rail Failure Working Group reached consensus on July 31, 2013. On April 16, 2014, the full Rail Safety Advisory Committee adopted consensus recommendations made by the Rail Failure Working Group. On July 25, 2014, the FRA distributed the final Rail Failure Prevention Program guidance document to the RSAC and the Rail Failure Working Group, with a request to distribute throughout the railroad industry. The FRA also stated that the guidance document would be formally issued to railroads by FRA Administrator Szabo. These efforts along with industry acceptance (concurrence) are a substantial effort to significantly reduce broken rail accidents due to rolling contact fatigue, and provide improvements for better management of the industry risk management programs.

RSAC Language for Industry Guidance from FRA

FRA recommends that track owners consider developing and maintaining a Rail Failure Prevention Program for rail in the following main track:

- Class 2 track with annual tonnage of at least 25 million gross tons (MGT), or is a HAZMAT route.

- Class 3 track with annual tonnage of at least 25 MGT, is a HAZMAT route, or has regularly scheduled passenger service; and

- Class 4 and 5 track.

The Rail Failure Prevention Program should contain the following:

1. Rail head wear guidelines.

2. Guidelines that address the identification and management of visible rolling contact fatigue damage and improve rail performance.

3. An inspection plan that includes rail head wear measurements for comparison with established guidelines and means for identification of visible rolling contact fatigue damage.

4. Corrective actions to be taken when rail head wear guidelines are exceeded or visible rolling contact fatigue damage is identified.

5. Training for the implementation of the procedures listed above.

Specific Rail Failure Prevention Program Content

FRA recommends that the Rail Failure Prevention Program contain the following elements:

A. Rail head wear guidelines that include:

    1. Consideration of rail section, class of track, alignment, and other criteria as determined by the track owner.

    2. Specification of the measurement methods to be used and definition of reference points for these measurements.

B. An inspection plan to measure rail head wear that considers alignment, class of track, and other criteria as determined by the track owner.

C. Guidelines for the management of visible rolling contact fatigue damage and improved rail performance. Procedures may include lubrication, friction modification, or grinding.

  1. Lubrication or friction modification practices should consider train traffic, alignment, curvature length, and grade.

  2. Rail grinding or other techniques that address maintenance of rail head profile to improve rail surface conditions and reduce visible rolling contact fatigue damage.

D. Guidelines that address the monitoring of visible rolling contact fatigue damage, including the following:

  1. Inspection procedures to identify areas of visible rolling contact fatigue damage. The inspection procedures should include prioritization methods for assessing the severity of these conditions.

  2. Establishment of inspection frequencies to monitor development of visible rolling contact fatigue damage that consider alignment, track class, and other factors as determined by the track owner.

E. Guidelines for applying rail grinding or other techniques that improve rail head profile and visible rolling contact fatigue damage. The guidelines should identify:

  1. The techniques used.

  2. Application of the techniques considered, taking into account alignment, tonnage, class of track, or other factors as determined by the track owner.

  3. Prioritized corrective action for areas of significant visible rolling contact fatigue damage to reduce defect development.

  F. Recordkeeping procedures for each inspection performed under the Rail Failure Prevention Program. The record should include the following items:

  1. The limits of the territory inspected.

  2. Head wear measurements.

  3. Areas identified as having significant visible rolling contact fatigue damage and type of rail surface degradation.

G. Guidelines for rail service life monitoring that consider class of track, tonnage, rail section, rail wear, visible rolling contact fatigue damage, defect development, rail failure history, and other factors as determined by the track owner.

H. Recommended corrective action to be taken when rail head wear or visible rolling contact fatigue damage guidelines are exceeded.

I. A system or process designed for the recording and tracking of rail defects and rail failure incidents with the capability to identify locations with sudden or accelerated failure rates.

J. Training for employees involved in the implementation of the written Rail Failure Prevention Program, with provisions for periodic retraining for those individuals.