Safety and Service Delivery Committee

Information Item III-B

April 12, 2018

Rail Safety Initiatives

Washington Metropolitan Area Transit Authority

Board Action/Information Summary

○ Action ◉ Information	MEAD Number: 201979	Resolution: ○ Yes ◉ No

TITLE:

Rail Safety Initiatives

PRESENTATION SUMMARY:

The Department of Safety and Environmental Management (SAFE) will update the Board on the Farragut North derailment, as well as recent rail safety initiatives.

PURPOSE:

The Safety and Service Delivery Committee will be informed of the Farragut North derailment root cause and the resulting track inspection improvements being made. The Committee will also be informed of additional recent rail safety initiatives that will improve employee and customer safety.

DESCRIPTION:

WMATA continues to work toward strengthening the safety of the system for its employees and the public.

Key Highlights:

• The Farragut North derailment investigation has concluded and the report was transmitted to the FTA for final review. The root cause of the derailment was corrosion pitting on the underside of the base of rail that eventually escalated into a fatigue crack.

• Although this type of crack would be undetectable, multiple track process improvements have begun to bolster track inspections, including tie scanning, rail base corrosion testing, utilization of high resolution cameras and ultrasonic testing.

• A Safety Risk Management process is followed to identify several methods to reduce risk in the system. Hazard assessments of common rail activities led to initiatives aimed to improve employee and customer safety.

Background and History:

On Monday, January 15, 2018, a Glenmont bound Red Line Train derailed due to a broken rail on Track 1, approximately 1000 feet south of the Farragut North Station. The root cause that led to the derailment was corrosion pitting on the underside of the base of rail that eventually escalated into a fatigue crack. Based on a third party analysis of the incident, this type of crack would be undetectable through track inspections. Automated track inspections have been put into place to bolster track inspections.

In addition to the track inspection improvements, WMATA has used a Safety Management Systems (SMS) approach to identify other rail safety initiatives to reduce or manage hazards throughout the system while improving employee and customer safety.

Discussion:

WMATA is increasing the use of new track inspection technology which results in improved data collection. Automated testing equipment can provide new insights in the condition of the track assets through specific measurements or imaging of selected components. New technology does not replace track walking, but complements the walking track inspection program. The track inspection technologies are described below:

Tie Scanning and Rail Base Corrosion Testing
Tie scanning assesses wood ties based on 20+ variables to determine tie condition, which leads to a score on a 1 to 4 scale. Rail base corrosion testing assesses rail base corrosion by taking very precise measurements of the base of the rail and calculating the changes in the width of the rail base. Both testing types are scheduled for this spring. Results from this testing cycle will be compared to the last cycle, in 2015, to confirm appropriate frequency of testing, based on rate of change for components not replaced. The likely frequency will be between two and four years.

High Definition Track Scanning
High definition track scanning uses high resolution cameras to identify defects while moving at high speed. The images are then archived like inspection reports. A pilot using this technology occurred early this year.

The final report from this pilot will be used to update the track asset management database with more detailed condition information, particularly on the grout pad condition and rail inventory (e.g., rail manufacturer and roll date, which is important for trend analysis for rail breaks).

Following completion of the analysis work, an Request For Information (RFI) will be developed and issued to explore: purchasing equipment vs. contracting services; also, data management and industry best practices.

Track Geometry Vehicle and Ultrasonic Testing
The track geometry vehicle (TGV) measures critical track geometry at speed. One pass of the entire system takes about four weeks. This type of testing is currently conducted twice a year.

Ultrasonic testing (UT) tests the running rails and is used to identify internal defects that could cause rail breaks. One pass of the entire system takes two months. It was previously conducted twice a year; starting in FY19, testing will occur three times a year.

An RFI is currently being issued to explore separating UT equipment from TGV which would increase testing flexibility and frequency. The RFI will also review:

o Benefits of new UT technology.
o Contracting strategies (vehicle and/or services).
o Industry best practices for frequency of UT and TGV.

o Possible benefit of increasing both TGV and UT to four times a year.

In addition to the track inspection improvements, the following safety initiatives have been implemented.

Third Rail Mat Program
In 2017, there was an increase of incidents in which employees inadvertently made contact with an energized third rail or its components. The majority of the contacts occurred in work zones where the employees' equipment or tool made contact. Certain process changes were made to protect employees working in close proximity (i.e., not directly) to the third rail. This included removing power from the third rail, even if contact is not anticipated. Devices that audibly and visually alerts employees to the presence of voltage (called a WASAD) are installed after power is brought down to confirm this action.

In concert with WASAD placement, insulated mats are draped over the third rail coverboard which provides a physical barrier if power is accidently brought up, and if the WASAD fails. To support this initiative, safety bulletins describing the process, use, and limitations of the mats were provided to front line employees.

Additionally, a supporting program was developed that identifies the roles/responsibilities of using the mats, inspection processes, the specifications of the mat, and the lifecycle management. The insulated mats will be replaced on an annual basis, and will be marked with a specific color strip that will be used to easily identify the mat's age and batch. Additionally, the mats will be stamped with the required specifications and expiration date. This program began in late 2017 with over 150 mats distributed. To date, there have been no shock incidents since October of 2017.

Hard Hat Pilot
One third of traumatic brain injury fatalities are from falls from the same level; WMATA is looking for additional protection to prevent these types of injuries. This is especially important, as slips/trips/falls is one of the leading injury types at WMATA.

The new hard hat that is being piloted provides for lateral impact protection, including impacts from front, top, side and rear of helmet. The helmet also stays on the user's head during tumbling and multi-impacts due to a strap system similarly used on bike helmets.

As part of this pilot, participants will be provided training on proper helmet use and adjustment. Feedback will also be solicited from participants on the helmet performance. Pilot participants include personnel from engineering, construction, and track maintenance.

Boarding Area Signage
WMATA is piloting optimal train boarding platform area signage that informs customers of train door locations to expedite train loading. Additionally, floor markings will alert customers of uneven platform levels. As many stations are exposed to different elements, WMATA continues to explore more durable options for labeling.

Closed Circuit Television Monitors (CCTV)
Closed circuit television monitors have been installed at Brookland and Silver Spring

stations where the platform is curved and partially shaded under a canopy. The curvature and lighting difference makes it difficult for operators to see down the length of the train. To assist, CCTVs were installed that project video feeds of the trains' length to the operator at the end of the platform.

Roadway Worker Protection Access Guide
The Roadway Worker Protection Access Guide has been updated to reflect the changes noted in the most recent hot spot survey. The Guide will also include detailed system maps, as well as step-by-step instructions on how to call for specific levels of protection based on the section of track being accessed. There were two separate documents that covered the same type of RWP processes and language; the new Guide will consolidate all RWP references into one document.

Compliance and Industrial Hygiene Teams
The Safety Department has developed two new groups that will improve operations safety. The first group will focus on process safety compliance, with a specific emphasis on roadway worker protection safety rules compliance.

The second group will focus on industrial hygiene activities including analyzing, identifying and measuring workplace hazards. The goal is to spot hazards and help eliminate or control them through appropriate measures, including job hazard analyses. The industrial hygienists will also support the Hearing Conservation Plan, which was an FTA Corrective Action Plan.

First Responder Safety
Track and tunnel signage has also been improved. This was a result of National Transportation Safety Board (NTSB) Recommendation R-16-27, with the goal of reducing directional confusion in the tunnels, especially near diverging tracks/lines. Plain, color coded signage has been placed throughout the system. All actionable items assigned to this CAP were completed and submitted to the NTSB for closure.

FUNDING IMPACT:

There is no impact on funding for this information item.	
Project Manager:	Joseph Leader and Patrick Lavin
Project Department/Office:	Chief Operating Office, Department of Safety and Environmental Management

TIMELINE:

Previous Actions	Safety and Service Delivery Committee Meeting, December 14, 2017
Anticipated actions after presentation	N/A

Washington Metropolitan Area Transit Authority

Rail Safety Initiatives

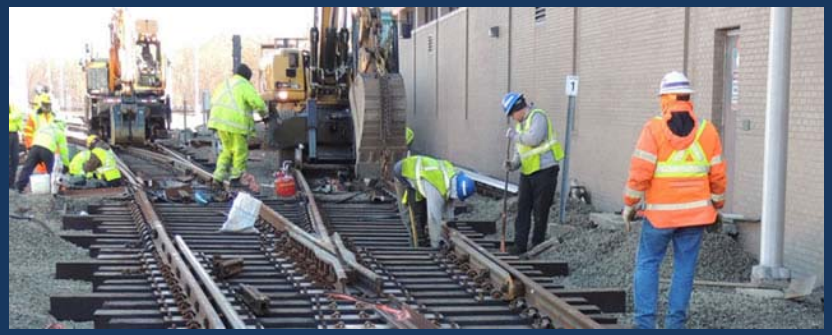
Safety and Service Delivery Committee
April 12, 2018

Purpose

To provide the Committee with the final briefing of the Farragut North derailment and recent rail safety initiatives

Agenda

- Final Derailment Brief
- Automated Track Inspections
- Employee Safety
- Customer Safety
- Roadway Worker Protection
- First Responder Safety



Final Derailment Brief

- Root Cause (third party verified):
  - Corrosion pitting on the base rail underside
  - Escalated into a fatigue crack
- Undetectable with conventional ultrasonic testing
- Corrosion pit not visible to a track inspector (bottom of rail)

- Changes made to derailment response
  - Immediately remove power
  - Start ground evacuation

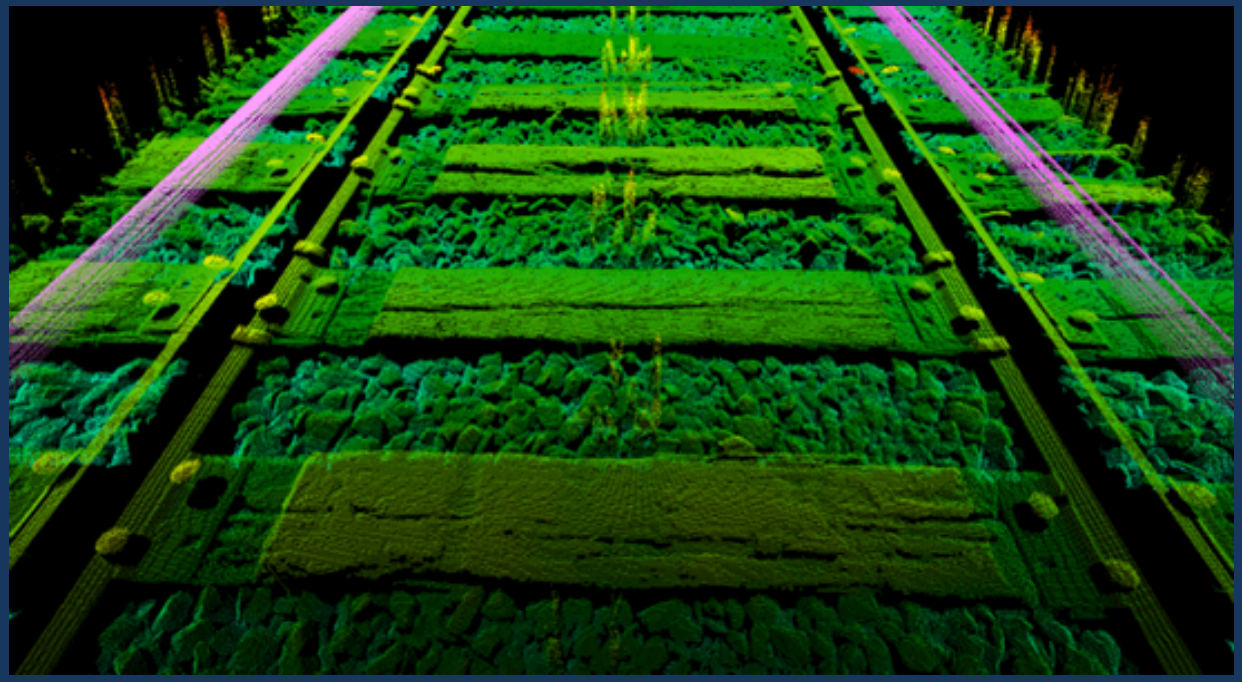
- Communications

Automated Track Inspections

- Tie scanning (planned 4th quarter FY18)
- Rail base corrosion testing (planned 4th quarter FY18)
- High resolution camera system (completed mid-March)
- Review of ultrasonic testing frequency (ongoing)
- Testing schedule

Tie Scanning / RBC Testing

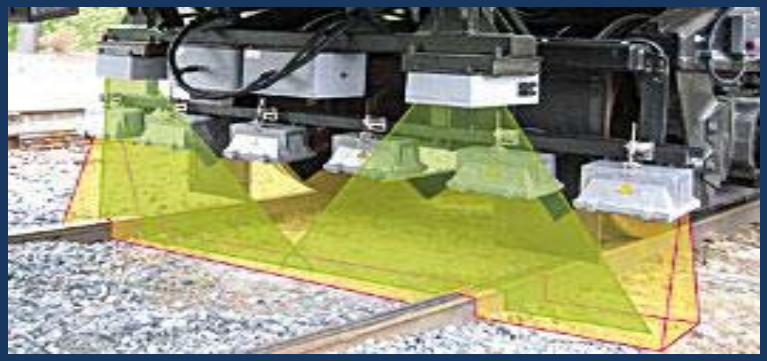
- Tie Scanning
  - Assesses wood ties based on 20+ variables
- Rail Base Corrosion (RBC)
  - Measuring changes in the width of the rail base



GREX Tie Scanning & RBC Testing

High Resolution Camera System

- High resolution cameras identify defects while moving at normal train speed
- Images archived similar to inspection reports



High Resolution Camera System

- Pilot included ENSCO technology as add-on to TGV run
  - Three defects identified: two cracked joint bars, one occurrence of consecutive missing stud bolts
- Update track asset management database
- RFI being issued to explore:
  - Purchasing equipment vs contracting services
  - Data management and industry best practices

Increasing Frequency of TGV & UT

- Three UT tests will be conducted, with two by contractor
- RFI being issued to explore:
  - Benefits of new UT technology
  - Contracting strategies (vehicle and/or services)
  - Industry best practices for frequency of UT and TGV

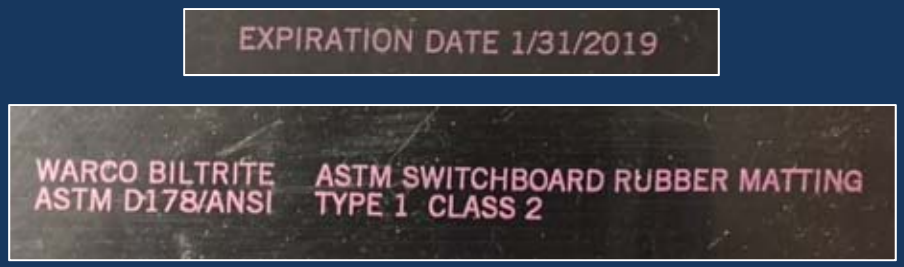
Inspection Schedule

Compared to industry-recommended inspection frequencies

Inspection Type	FRA	APTA	WMATA
Mainline Track Inspection	2x week	1x week	2x week
Automated Geometry	1x year if less than 40 MGT	1x year	2x year
Internal Rail Flaw Detection (Ultrasonic Testing)	Minimum of every 30 MGT or 370 days, whichever is shorter	1x year	3x per year
Cross tie density scanning	NA	NA	1x every two years
Rail base corrosion scanning	NA	NA	1x every two years
HD video scanning	NA	NA	1x year

Employee Safety

- Third Rail Mat Program (Employee and Contractors)
  - Five contact incidents in past two years
    - Four of five involved accidental tool/equipment contact
  - Protects against incidental contact with the third rail (de-energized)
  - Safety Bulletins, Hazard Assessments, Program developed



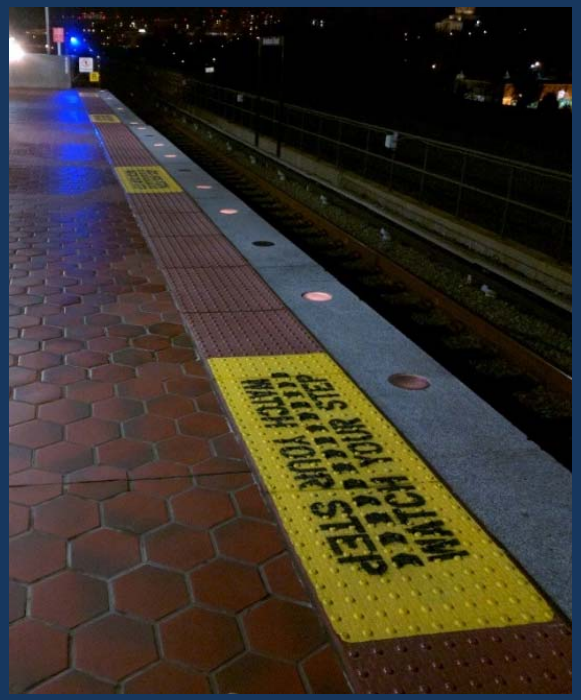
Employee Safety

- Hard Hat Pilot (100 helmets)
  - Current helmets require protection only from falling objects
  - Pilot project expands coverage for lateral impact protection
  - Helmet stays on head during tumbling and multi-impacts via strap system

Employee Safety

Customer Safety

- Pilot train boarding area signage
  - Identifies level platform boarding areas
  - Alerts customers to optimal areas to board the train
  - Braddock Road and Rhode Island Avenue Stations

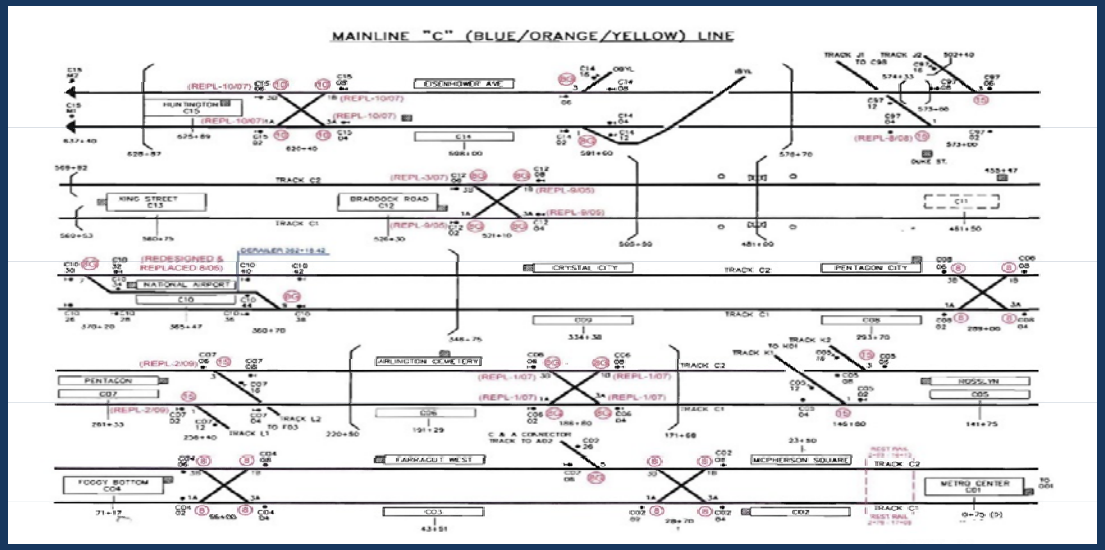


Customer Safety

- CCTV
  - Installed at curved stations
    - Brookland
    - Silver Spring
  - Improves opportunity for operators to see customer boarding rear cars of the train

Roadway Worker Protection

- Roadway Worker Protection Access Guide
  - Improved format and layout, includes:
    - Updated hot spot survey
    - System maps
    - Protection step-by-step instructions
  - Consolidates RWP documents into one source



Roadway Worker Protection

- Process Safety Compliance Group & Industrial Hygienists
  - Focus on
    - Safety rules compliance
    - Field industrial hygiene testing and monitoring
    - Job hazard analyses
  - Supports FTA CAP
    - Hearing Conservation Program

First Responder Safety

- Improved Tunnel Signage
  - NTSB Recommendation R-16-27
    - *"Install line identification and direction at tunnel entrances and inside tunnels"*
    - Status: Submitted; Under NTSB Review

Location: Outside Pentagon Station

Questions