Safety and Service Delivery Committee

Information Item III-A

January 25, 2018

Update on January 15, 2018 Derailment

Washington Metropolitan Area Transit Authority

Board Action/Information Summary

○ Action ◉ Information	MEAD Number: 201956	Resolution: ○ Yes ◉ No

TITLE:

Update on January 15, 2018 Derailment

PRESENTATION SUMMARY:

The Chief Safety Officer (CSO) and Chief Operating Officer (COO) will provide a briefing on the preliminary report on the January 15, 2018 derailment that occurred south of Farragut North Station.

PURPOSE:

In advance of the final investigative report, the CSO and COO will provide the Board and public with a briefing on the events and preliminary findings to-date of the Red Line train derailment between Farragut North and Metro Center.

DESCRIPTION:

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

Key Highlights:

- Train 106 (8 car-7K) derailed shortly after leaving Farragut North Station at approximately 06:26 on January 15, 2018. Although an investigation is underway to identify the root cause, preliminary findings point to a rail failure that likely occurred as the train was passing over the rail section
- Working with the DC Fire Department (DCFD), 63 individuals, including three WMATA employees were safely evacuated from the train.
- The public radio system used by the DCFD appeared to be working as designed.
- The internal radio communication system was working intermittently at the location of the derailment; it should be noted that the car-borne radio performed better than the handheld radios.
- Radio communication was available approximately 300 feet from the front of the train as well as on the adjacent track.

- The investigation continues into the cause of the rail failure, the remains of which have been sent to an independent expert.

Background and History:

At approximately 06:26 hours on Monday, January 15, 2018, a Glenmont bound Red Line Train ID 106 travelling at 37 miles per hour (MPH) derailed due to a broken rail at Chain Marker (CM) A1-028+20. The incident occurred on Track 1 approximately 1000 feet south of the Farragut North Station while traversing an unguarded curve with four inches of super elevation. At the time of the incident, Train ID 106 had just serviced the Farragut North Station and was on approach to Metro Center.

At 06:28 hours, the Train Operator aboard Train ID 106 reported to the Rail Operations Control Center (ROCC) that the train experienced an emergency brake application and smoke was coming into his cab. It is most probable that much of the “smoke” that was generated was the result of the sound proofing material coating affixed to the side of bench wall being pulverized as the car-bodies of the derailed cars scraped against it during the event, which produced clouds of dust. Fan operation was functional as observed by WMATA personnel on site.

At 06:46, a Metropolitan Transit Police Department (MTPD) Officer reported to the ROCC that the train appeared to have derailed. The MTPD officer was designated as the incident commander until the arrival of the DCFD. The Officer walked through the train cars to verify that no customers aboard the train were in need of medical assistance. During post incident response activities, it was identified that a total of six (6) axles on the trucks associated with the 5th (7214 – Axle #3), 6th (7215 – Axle #3, #1 and #2) and 7th (7315 – Axel #3 and #4) cars had derailed. The incident vehicle travelled in a derailed state for approximately 796 feet with the forward most derailed axle coming to rest at CM A1-20+24.

WMATA personnel and DCFD responded to the scene. A Unified Command post was established at Metro Center Station at the platform level. The Regional Fire Liaison at the ROCC was also engaged with the incident since the initial report of smoke. As part of the coordinated evacuation operation, the contact rail was de-energized at 06:48 hours on both tracks and power off was verified by WMATA personnel with a “hot stick”. Additionally, Warning Strobe Alarm Devices (WSAD) were set up along the roadway and 63 individuals (60 customers and three employees) were evacuated from the lead car 7306 to the roadway and safely escorted approximately 1700 feet to the Metro Center Station platform via Track 1 by MTPD, Office of Emergency Management (OEM), Rail Transportation (RTRA), and responding DCFD. The tunnel environment used as the evacuation route was properly illuminated and free of obstacles. The time from the report of the derailment to completion of the

evacuation was 1 hour and 38 minutes. There were no injuries reported as a result of this incident.

WMATA Safety personnel responded to the scene and commenced with investigative activities. An eight foot section of rail was found to be fractured and was determined to be the Point of Derailment (POD). A crack at the base of the broken rail appeared to show signs of oxidation, which suggests that the integrity of the rail was compromised prior to the rail fully fracturing during the incident. This section of rail was removed, quarantined and sent for metallurgical testing to aid in identifying the root cause of the derailment. A final determination on the root cause or contributing factors in this incident has not been made; however, the fractured rail obviously played a significant role in this event. At 10:30 AM on January 16, 2018, normal service resumed.

The public radio system utilized by the DCFD was working as designed. WMATA's internal radio was intermittent in the immediate location of the derailment, but was fully operational 300 feet from the location and on the adjacent track. It should be noted that the car-borne radio performed better than the handheld radios. The investigation of this incident is ongoing.

Discussion:

The Chief Safety Officer and Chief Operating Officer will present a preliminary review of the incident and findings to date as the investigation continues.

FUNDING IMPACT:

Incident investigation is included in the each year's budget.	
Project Manager:	Patrick Lavin and Joseph Leader
Project Department/Office:	Office of System Safety and Environmental Management and Chief Operating Officer

TIMELINE:

Previous Actions	None.
Anticipated actions after presentation	• Continue the investigation into the incident of January 15, 2018 • Implement necessary corrective actions as a result of the investigation

Washington Metropolitan Area Transit Authority

Derailment: January 15, 2018 Farragut North Station

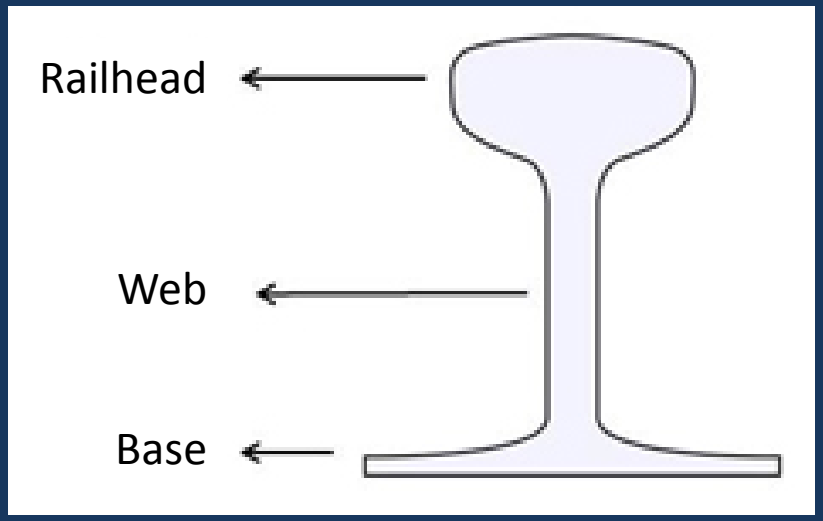
Safety & Service Committee
January 25, 2018

Agenda

- Common Causes of Rail Defects
- Broken Rail Detection
- Track Diagram
- Executive Summary
- Timeline of Events
- Preliminary Findings
- Next Steps

Common Causes of Rail Defects

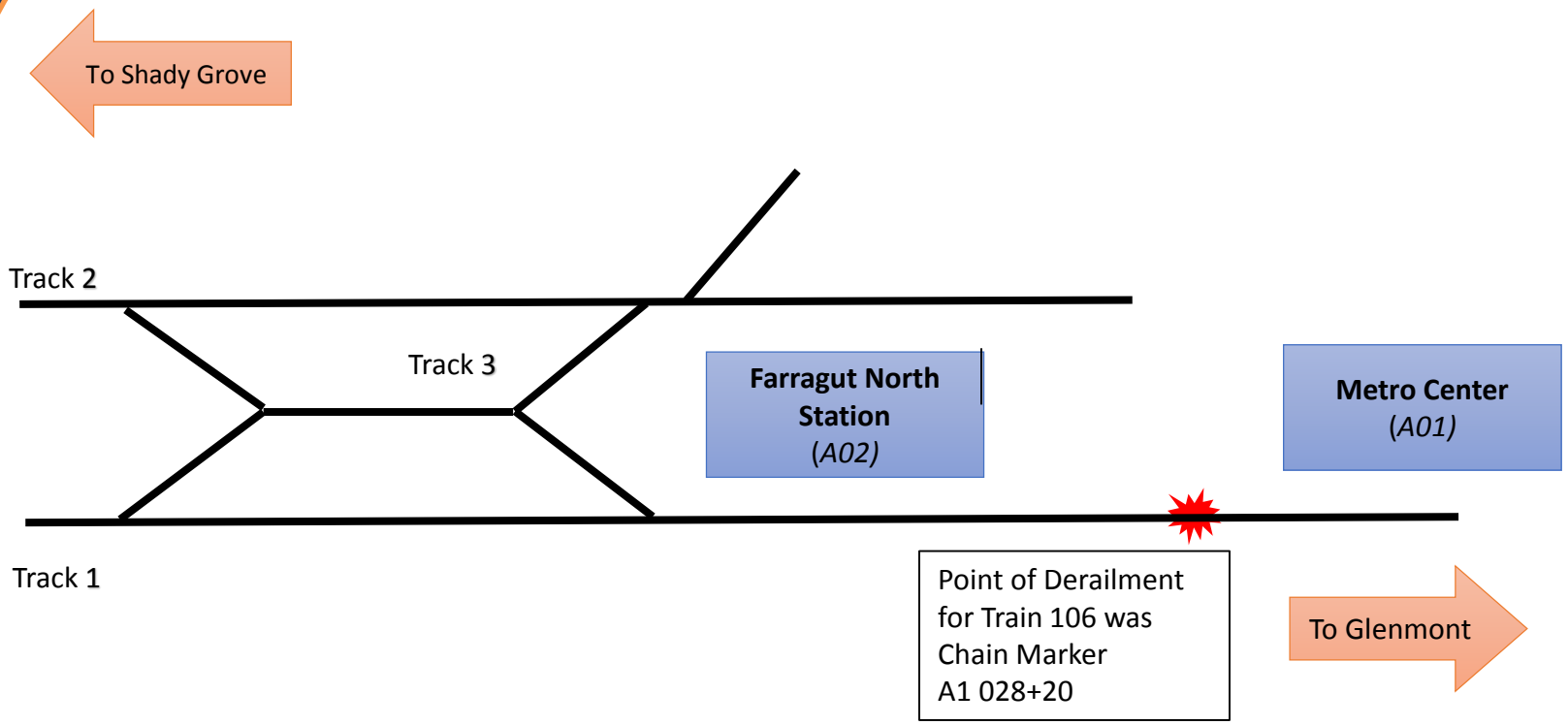
- Base of Rail Corrosion
- Rail Surface Defects
- Rail Wear
- Fastener Deterioration/Poor Support
- Track Geometry Conditions
- Weather (Temperature)



Broken Rail Detection

- How are Broken Rails Detected?
  - Ultrasonic Testing
  - Track Walking Inspections
  - Disruptions to the Signal System
    - Broken rail protection is present on both running rails

Track Diagram



Executive Summary

- Train 106 (8 car-7K) derailed shortly after leaving Farragut North Station
- Compromised rail at Chain Marker A1 028+20
- First two cars successfully negotiated the compromised rail
- Rail fracture began beneath the third car
- Cars 1 - 4 were properly situated on the rails when the train came to rest
- Fifth, sixth, and seventh cars = six axles derailed
- Eighth car derailed and re-railed
- Train travelled 796 feet in a derailed state

Executive Summary cont'd

- Train Operator reported "brakes in emergency" and smoke
- Momentary activation/re-closure of third rail breaker
- "Smoke" most likely result of pulverized concrete dust
- Poor CRCS radio uplink capabilities
- PSRS Working as Designed
- MTPD Officer (incident commander) was on incident train
- Unified Command established
- Total of 63 individuals evacuated
- Tunnel lighting illuminated
- No obstacles on right of way
- Zero injuries were reported

Timeline of Events

6:25AM
Train #106 departs Farragut North Station

6:26 AM
Derailment in progress

6:28 AM
Train #106 Contacts the ROCC and reports smoke and BIE

ROCC Regional Fire Liaison made aware of incident

6:29 AM
Tunnel fans activated

6:35 AM
WMATA notified DCFD

6:42 AM
DCFD arrives at Farragut North Station

6:46 AM
MTPD Contacts ROCC via radio and reports the derailment

6:48 AM
ROCC removes third rail power on both tracks

6:48 – 8:02 AM
Passenger safety assurance activities being conducted

8:02 AM
Controlled evacuation from Lead Car 7306 begins

8:24 AM
All Customers reported clear of roadway

8:53 AM
DCFD turns scene over to WMATA

Time Between the Report of the Train Derailment to the Completion of the Customer Evacuation = 1 hour, 38 Minutes

Findings

- Systems Communications
- Evacuation/Life Safety
- Track Inspection and Testing
- Track and Structures
- Human Factors
- Vehicle
- Quality Assurance

Systems Communications

- Findings:
  - Poor CRCS radio communication - uplink
  - CRCS Inspections:
    - Annual PMI (signal amplifier) - March 27, 2017
    - Annual PMI (feeder amplifier) - October 3, 2017
    - Downlink signal scan (confirms signal strength) - December 6, 2017
  - PSRS system worked as designed
    - Last tested by DC - January 5 & 12, 2018
  - T/O radio next calibration date - July 12, 2019
  - T/O radio being tested as part of post incident activities
  - ETS phones were working

- Immediate Actions:
  - Corrected CRCS uplink issue in incident area
  - System-wide inspection of PSRS & CRCS was conducted

Evacuation / Life Safety

- Smoke reported likely concrete dust
- Tunnel lighting illuminated
- Evacuation path was free of obstructions
- No injuries were reported
- Tunnel fans working
- PLNT engineering analysis requested of fan operations
- Incident Hot-wash conducted

Track Inspection and Testing

- Track Walker Inspections (2x week)
  - January 3, 7, 10 of 2018
- Track Geometry (2x year)
  - October 2, 2017 - No defects found
- Ultrasonic Testing (2x year)
    - Metro exceeds industry standards
      - FRA requires 1x annually
      - APTA recommends 1x annually
      - FTA no regulatory requirement
    - August 9, 2017 - No defects found
    - Independent analysis-confirmed no defects
- Rail Grinding Program (136 miles completed in 2017, or over 50% of system)
- No history of rail breaks in the area
- Area not part of SafeTrack activities

Track and Structures

- 7K video reflects rail was intact
- No ATC issues (bobbing track circuits)
- Rail manufactured in 1993
- Rail located on low side of unguarded curve at CM A1 28+20
- Crack present at base-appeared to exhibit signs of oxidation
- Environmental conditions-Dry
- Weather-under evaluation
- Rail sent for independent analysis

Human Factors

- Train Operator travelling at 37 MPH at time of derailment (required speed 35 MPH)
- Train Operator sent for post incident testing
  - Result - Negative
- Fatigue analysis
  - No significant risk of impairment

Vehicle

- All rail vehicles involved were compliant with their preventative maintenance inspections
- Rail Car Damage
  - Body (side damage)
  - Trucks
  - Brake Rotor
  - Gearbox
- Engineering analysis/damage costs pending

Quality Assurance

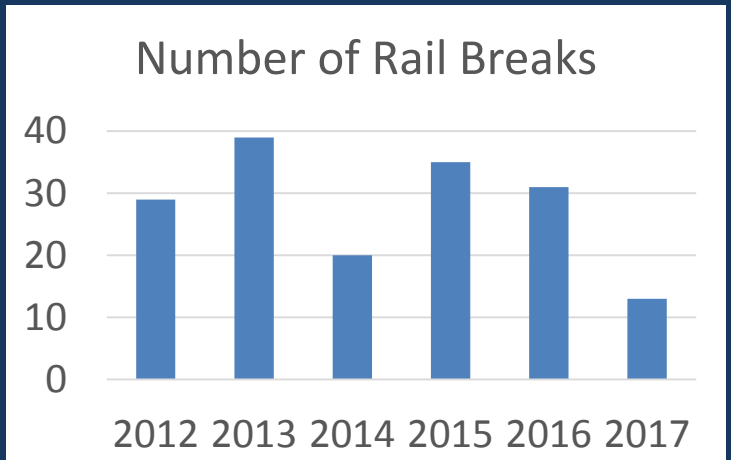
- QICO Communications audit-commenced January 23, 2018
  - Audit was scheduled prior to derailment
- 21 FTA Communication CAPs
  - 10 Closed
  - 2 Under Review
  - 9 In Development

Next Steps

- Awaiting results of independent broken rail analysis
- Conducting internal broken rail trend analysis
- Evaluating current Automated Track Testing frequencies
- Implementing FTA communication CAPS
- Evaluating communications Operations Administrations Policy & Resources
- Updating internal policy on radio testing processes to capture all required tests
- Radio Project-CIP 136
  - Comprehensive Radio Upgrade currently underway - Scheduled for completion in Fall 2022

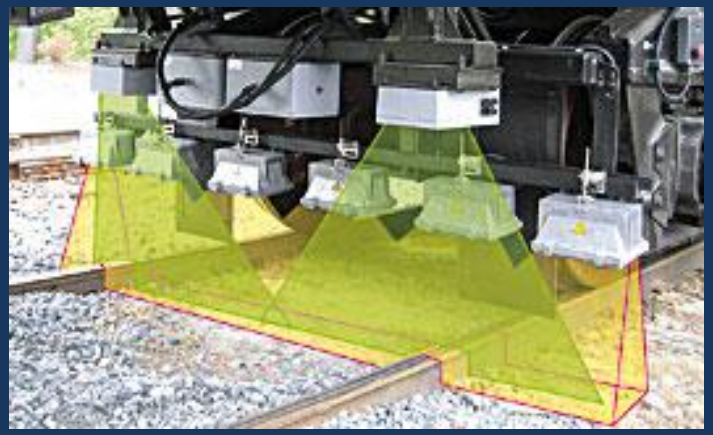
Expand Testing Programs

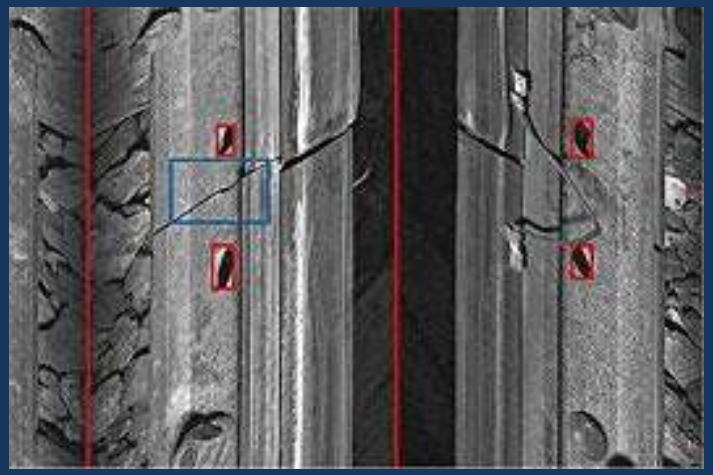
- Increase Frequency of Ultrasonic Testing
- Tie Imaging Scanning
- Rail Base Corrosion Scanning
- Lateral Load Testing



Evaluate HD Track Scanning System

- Start High Definition Track Scanning:
  - Identifies cracks visually seen at high resolution; scans can be saved for historical review
  - Subject of recent FTA study (Report No. 0049 for Automated Track Video Inspection Pilot Project)





Questions