

Washington Metropolitan Area Transit Authority  
**Board Action/Information Summary**

Action  Information

MEAD Number:  
201664

Resolution:  
 Yes  No

**TITLE:**

Update on Derailment Investigation

**PRESENTATION SUMMARY:**

Staff will provide an update on the August 6th derailment of a metrorail train between Federal Triangle and Smithsonian including responses to the Board's Committee Members questions.

**PURPOSE:**

To provide further information on the joint Tri-State Oversight Committee (TOC) and Department of Safety and Environmental Management (SAFE) investigation into the August 6th derailment and respond to the questions and provide an update on other external reviews.

**DESCRIPTION:**

Staff will provide a status update on the joint investigation by TOC and SAFE into the August's Metrorail derailment and provide follow-up information from the September 3rd Safety and Security Committee.

**Key Highlights:**

- Technical Incident Report released August 28, 2015
- TOC/SAFE Investigation ongoing with submission to TOC in early October 2015
- TOC approval of investigation reported expected by mid October 2015

**Background and History:**

The recent incident of August 6, 2015 of a derailment of a Metrorail train has raised concerns and issues internally and externally which are being discussed in an effort to identify cause(s), develop corrective actions and ensure proper resources are available.

The derailment occurred at approximately 5:20AM between Federal Triangle and Smithsonian when five cars came off the rails; there were no passengers on board. The incident caused significant disruption of service over the next two days followed by single tracking as inspections and repairs were made. The technical incident report produced by the Deputy General Manager of Operations (DGMO) on August 28th listed the preliminary cause as failure of the rail fasteners with potential contributing factors listed as wide gauge near point of derailment, loose or broken studs, track dynamics, track geometry inspection process and insufficient "check and balance" policies and

procedures in place. The DGMO took immediate corrective action such as requiring detailed re-inspection of rail system to process changes to ensure checks and balances are in place to third party review of derailment.

**Discussion:**

The presentation is the continuation of the September 3, 2015 special Safety and Security Committee meeting to provide information to the Board and public on status of TOC/SAFE Investigation, responses to specific Board's questions and provide update on external reviews.

**FUNDING IMPACT:**

Information item only

**TIMELINE:**

<b>Previous Actions</b>	September 3, 2015 presented information at special Safety & Security Committee meeting
<b>Anticipated actions after presentation</b>	Continue moving forward with updates to the stakeholders on final investigation report as well as closing of CAPs.

**RECOMMENDATION:**

To inform the Board's Safety and Security Committee of the status of the TOC/SAFE Investigation, respond to questions surrounding the incident and provide an update on other external reviews.

# M E M O R A N D U M



SUBJECT: Board Member Questions  
August 6, 2015 Derailment

DATE: September 18, 2015

FROM: AGM TIES – Andrew Off  
*AO*

THRU: DGMO – Robert Troup *ART*

TO: Interim GM/CEO – Jack Requa *Jack Requa*

This memorandum responds to Board questions from the September 3, 2015 Special Safety Committee Meeting regarding the August 6, 2015 derailment at Federal Triangle to Smithsonian.

Below are the questions/requests and the accompanying response:

1. What is the number of derailments in the last four years, and how does that compare with other transit agencies.

Response: In accordance with information maintained by the National Transit Database (NTD), WMATA experienced fourteen derailments during calendar years 2011-2015 (year-to-date). The below bullets define further details of these fourteen derailments:

- Four (4) Mainline Derailments:
  - Three (3) track alignment derailments
    - One (1) rail buckle
    - One (1) picked switch point
    - One (1) wide gauge
  - One (1) rail car caused derailment
- Ten (10) Yard Derailments:
  - Ten (10) operational caused derailments
    - Six (6) track maintenance equipment
    - Four (4) rail cars

According to the NTD, during calendar years 2011-2015 (year-to-date), the Chicago Transit Authority (CTA) experienced 17 derailments, New York City Transit (NYCT) experienced 12 derailments, the Massachusetts Bay Transit Authority (MBTA) experienced four derailments and the Southeastern Pennsylvania Transit Authority (SEPTA) experienced three derailments. The NTD statistics do not discriminate between yard, mainline, rail car and track maintenance equipment derailments;

therefore, WMATA is not able to directly compare the type of derailments that occurred at WMATA with those of other transit agencies.

2. Were any railcars damaged in the derailment incident, and if so, how many, what is the repair cost, and how long will it take to repair them?

Response: The train consist which derailed was a six car train. Of the six cars involved in the derailment, two were inspected and immediately returned to service, two were inspected and returned to service within a week after minor repairs were made and two cars remain out of service. The two remaining out of service cars are 1000 series cars which require new trucks and rear drawbars. It is expected that these two cars will return to service no later than the end of January, 2016. The total value of all rail car repairs, to include labor, supplies and materials is approximately \$177,000.

3. What is the number of fasteners that are currently beyond their useful life?

Response: All track components are replaced based on their existing condition as measured against WMATA's track standards. How long a track component remains serviceable is often a function of the environment and not a function of how long the component has been in service. Therefore, track component replacement is driven by inspection and performance data rather than time in service.

Based on WMATA's current fastener capital program, it is estimated that 32,000 direct fixation fasteners require replacement in order to remove all fasteners which are not performing adequately. Based on current forecasts, WMATA plans to replace approximately 27,000 fasteners in FY16, and, for years thereafter in order to ensure an acceptable level of state of good repair for the approximately 550,000 fasteners in the system.

4. Number of track walkers and staffing history over the last 10 years. When conducting visual track inspections, how many track walkers conduct the inspections, and how many are watchmen? How does WMATA ensure that track inspections work?

Response: Currently, WMATA has 61 track inspectors and nine track inspection supervisors. WMATA maintenance policy requires that segments of mainline track are inspected via a walking inspection two

times per week. An inspection consists of two track walkers. One member of the team inspects track while the other member of the team performs watchmen duties. From a quality control perspective, track inspection supervisors are required to review all daily inspection reports and must conduct three field checks per week. The table below depicts the historical staffing level of track inspectors at WMATA.

2005	32
2006	45
2007	45
2009	33
2010	46
2011	46
2012	44
2013	51
2014	61
2015	61

5. Identify more information to disclose to the public, such as rail conditions and track worker inspectors.

Response: WMATA intends to continue our practice of proactively communicating the condition of our assets with our customers and is willing to identify other types of information that could be shared with the public. As an example, WMATA communicates the type of work conducted during scheduled maintenance windows and the location of speed restrictions throughout the system. WMATA also communicates the status of many critical assets via our Key Performance Indicators (KPIs), such as rail car availability and elevator and escalator availability.

6. Need to get more best practices fresh eyes review on the organization.

Response: WMATA will continue to conduct industry research and build upon our strong partnership with our fellow transit agencies. WMATA is focused on continually improving and will remain amenable to receiving external feedback regarding industry best practices. As an example of this culture, on August 6<sup>th</sup>, 2015, three (3) members of the MBTA's leadership team were at WMATA to discuss maintenance of way and capital program best practices. WMATA regularly seeks the advice of industry experts to ensure our track maintenance policies and procedures adhere to all applicable standards and industry best practices. As an example, an expert track maintenance consultant has reviewed and

signed off on WMATA's track maintenance manual. We have also contracted with this track expert to conduct an independent review of the August 6<sup>th</sup> derailment. WMATA has hosted three (3) APTA peer reviews over the preceding two years. In July of 2013, WMATA hosted an APTA capital peer review regarding our track buckle derailment incident of July 2013. In April of 2014, WMATA conducted a four day peer review of our Capital and State of Good Repair program. And third, WMATA held an APTA peer review in March of 2015 after the tragic events at L'Enfant Plaza to critique our Rail Operations Control Center. Most recently, WMATA's Deputy General Manager for Operations traveled to Atlanta on September 15<sup>th</sup> to meet with numerous executives from MARTA to discuss industry best practices.

7. Who signed off on the process for Track Geometry Vehicle (TGV) review?

Response: The TGV process was not codified under the signature of a WMATA employee(s). Although numerous documents exist which detail the various functions of the TGV, none were signed as official policy. We are correcting this situation and plan to have a signed policy no later than the end of September.

8. When we introduce new equipment, will we make it a standard operating procedure to put policies and procedures in place?

Response: WMATA will develop an Organizational Administrative Policy (OAP) which will outline the requirements that must be attained prior to a new piece of track equipment entering service. This OAP will not identify those requirements already covered under the standing Safety and Security Certification process. This OAP will focus primarily on how the equipment is used within WMATA's system. WMATA plans to complete this OAP by the end of November.

9. Where are we on ties and fasteners? Are we approaching a steady state of repair? Does the derailment incident have an impact on our progress to date?

Response: From FY11 to present, WMATA has replaced 68,903 of the 247,140 wooden cross ties within the system and 102,996 of the 550,000 direct fixation fasteners within the system. At the end of FY17, WMATA is scheduled to eliminate the back log of wooden cross ties at which time WMATA will enter a cyclical state of good repair maintenance model. Early in FY17, WMATA is scheduled to eliminate the backlog of fasteners

and continue with our state of good repair program. It is not anticipated that the derailment will negatively impact WMATA's ability to reduce the track component backlog.

10. Provide total number of gauge rods in system.

Response: As of September 9, 2015, WMATA's records depict 348 gauge rods in the system. As noted previously, gauge rods do not represent a safety concern; however, they do represent the need for further maintenance efforts to effect a permanent repair. Although still acceptable for return to service purposes, WMATA is now focused on performing those permanent repairs within 30 days of gauge rod installation. It is estimated that it will take approximately 11 months to remove the backlog of gauge rods.

11. Status of temporary repairs vs. permanent repairs at the derailment site

Response: The segment of track in the vicinity of the derailment is safe for operations at the maximum design speed of 35 mph. WMATA plans to install new fastening systems, which are required to remove some gauge rods in the derailment area, during weekend work from October 2-5, 2015.

12. Provide the report on human error safety risk points, gaps and needed actions; also provide 3rd party analysis/report of derailment.

Response: It is estimated that the 3<sup>rd</sup> party derailment report will be final by the end of October, 2015. WMATA will deliver to the board as soon as possible thereafter. WMATA continues to develop the requirements for the human error analysis task order and will provide to the Board once the analysis is finalized.

13. Did the track walkers identify the wide gauge and fasteners? Should they have? If yes, what happened?

Response: WMATA's investigation included interviews with those track walkers who most recently inspected the track just prior to the derailment. These inspectors did not identify the lack of fastening capability nor the wide gauge. The inadequacy of fastening capability is often discovered due to wide gauge reported by the TGV. The track walkers inspection of the fasteners and the fastening systems is primarily focused on missing components (clips, bolts, studs) and visual deterioration (cracking, delamination). Via visual inspection, if all

components are present and no deterioration is observed, a trained inspector would more than likely not have the capability to identify a defective fastening system. Particularly in tight radius curves, it is very difficult to visually identify wide gauge unless the track walkers are provided geometry data which notes wide gauge. The most likely failure mode of a fastening system is failed anchorage between the stud bolt, which holds the fastener in place, and the concrete invert. This failure mode is not identifiable during a visual walking inspection of the track. This circumstance highlights the critical purpose of geometry data as not all track defects are visible to the trained track inspector.

14. What is the role of safety with respect to the derailment incident and overall? What should the role of safety be going forward?

Response: The role of the Department of Safety and Environmental Management (SAFE) with respect to the derailment incident or any incident is (a) determination of root cause based on investigation, (b) notification of external agencies such as NTSB, TOC, OSHA, etc., (c) lead/coordination with these various agencies, and to (d) prevent future incidents through mitigation/alleviation whether by engineering modifications, process change, safeguards, training, etc. In all incidents the level of effort is based on severity of the incident as documented in the approved System Safety Program Plan and Accident/Incident Policy and Instruction.

The role of SAFE moving forward is to continue to audit/review the Department of Transit Infrastructure and Engineering Services (TIES) and Office of Rail Transportation (RTRA) for rules and procedures compliance per element #13 of the System Safety Program Plan. However, SAFE is currently establishing a compliance check requirement against track walker inspection operations. In addition, in review of methods to become more proactive and predictive in our approach to managing hazards, SAFE's Rail Safety and Facilities Division has changed assignments of the Rail Safety Officers with a focus on a dedicated Officer for selected departments. Each Rail Safety Officer has been assigned to the following disciplines: Rail Transportation, Rail Operations Control Center, Rail Car Maintenance, Rail Car Engineer, System Maintenance, Elevator and Escalators, Rail Training, Track and Structures, Plant Maintenance and Track Access and Support Services. This will assist SAFE in identifying more closely where the data is being generated and deposited that points toward potential hazards.



Finally, SAFE is exploring bringing on additional support in the area of System Modification and Safety Certification. The Engineering Modification Instruction (EMI) process is the method utilized to assure that safety is not adversely affected by rail system modifications and currently not subject to the System Safety and Security Certification Process. Incoming staff responsibilities will ensure that the required safety analysis is performed on the proposed modifications to identify hazards that might arise because of implementation of the proposed modification.

15. Regarding TGVs: To what extent can the software be updated to remove the reporting of known exceptions (areas of the track such as at an interlocking, where track gauge can be wide)? Do peer agencies with TGVs have this capability? To what extent can the software know with sufficient precision where it is along the track? To what extent does the software know if it's measuring track width at frogs or interlockings, as opposed to regular track sections? Do inspectors and managers that operate the TGV have a track mileage inspection quota? Does this compromise the quality of their inspection, especially if WMATA adds another step to the process?

Response: WMATA will discuss software modifications with the manufacturer no later than the end of September 2015 in order to determine if the software can be modified to prompt the user for confirmation prior to the deletion of what is perceived as a false positive measurement. In addition, WMATA will discuss the relative intelligence of the TGV to determine if the software can be amended so that the TGV is programmed to recognize the type of track which it is traversing (joint, switch, frog, rail). When starting a TGV inspection, the track line, track route and chain marker information are input to the Track Geometry Measurement System (TGMS). This informs the TGMS of the test location start point. As the vehicle moves, the TGMS calculates its chain marker position based on where it started and vehicle speed. GPS was considered, but is not functional in the underground system; however, GPS data is recorded for the above ground system. The positioning system within the TGMS is relatively accurate and known points are input to the TGMS system as the TGV inspects the tracks in order to "update" the TGMS positioning system. The TGV inspects the geometry of the all mainline tracks a minimum of three times per year. The TGV staff do not have a quota, other than the requirement to perform at least three geometry tests per year as noted above.

16. Why did the 10 fasteners involved in the derailment incident fail? How old were these fasteners?

Response: We have not yet concluded the cause of why the fasteners failed, and investigators are awaiting metallurgy results to complete their analysis. The fasteners being examined were located in an area of track in the system that has been in service since 1977. Based on the generation of fasteners used in that area, we believe these components were installed in the mid-1990s.



Washington Metropolitan Area Transit Authority

# Update on Derailment Investigation

Moving Metro Forward **Safely**

Safety and Security Committee  
September 25, 2015



# Incident Summary

- August 6, 2015 at 5:20 a.m.
- Derailment between Federal Triangle and Smithsonian
- Five cars came off the rails; no passengers
- Manual operation; traveling approx. 15 mph
- Significant disruption August 6-7; total shutdown followed by single tracking





# Background

- Deputy General Manager Operations (DGMO) releases Technical Incident Report on August 28
- DGMO implemented series of corrective actions
- Full Investigative Report underway by Tri-State Oversight Committee (TOC) and Safety Department (SAFE)
- Special Safety & Security Committee held September 3
- Response provided to Committee questions



# TOC/SAFE Derailment Investigation

- Joint investigation ongoing / Full participation
- Elements eliminated as contributing factors
  - Train Operator actions
  - Rail car vehicles
- No findings with MTPD or ROCC response/actions
- Adopted rail car event recorder (VMS) data
- Fasteners sent out for metallurgical testing
- On-target for report submission to TOC early October 2015
- TOC approval/Final report before end of October 2015

# Questions / Answers