

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

Action  Information

MEAD Number:  
201756

Resolution:  
 Yes  No

**TITLE:**

NTSB Investigation Report, L'Enfant Plaza

**PRESENTATION SUMMARY:**

The Department of Safety & Environmental Management (SAFE) will brief the Board on the National Transportation Safety Board (NTSB) Accident Investigation of the January 2015 L'Enfant Station Plaza Electrical Arcing and Smoke Incident.

**PURPOSE:**

As promised at the May Safety Committee meeting, the Board will receive a more complete briefing on NTSB Accident Investigation. Further, the committee presentation provides transparency to our stakeholders, employees and public in the Washington metropolitan area community.

**DESCRIPTION:**

WMATA continues to work collaboratively with all external agencies in an effort to strengthen the safety of the system for its employees and public.

**Key Highlights:**

- Probable cause of the January 12, 2015 incident was “a prolonged short circuit that consumed power system components” resulting from the transit agency’s “ineffective inspection and maintenance practices.”
- NTSB held its public Board meeting and approved the L'Enfant Smoke and Arcing Incident report with 43 findings and 31 recommendations being adopted; 24 new recommendations to WMATA.
- There are a total of 31 NTSB recommendations; four early recommendations into the L'Enfant Plaza incident, three previous recommendations plus the recent 24 recommendations.

**Background and History:**

On January 12, 2015, Washington Metropolitan Area Transit Authority (WMATA) southbound Yellow Line train 302, with about 380 passengers on board, stopped after encountering heavy smoke in the tunnel between the L'Enfant Plaza station and the

Potomac River Bridge in Washington, DC. The operator of train 302 told the Rail Operations Control Center (ROCC) that the train was filling with smoke and needed to return to the station. The WMATA ROCC allowed train 510, following train 302, to enter the L'Enfant Plaza station, which also was filling with smoke. Train 302 was unable to return to the station before power to the electrified third rail, which supplied the train's propulsion power, was lost. Some passengers on train 302 evacuated the train on their own, and others were assisted in evacuating by first responders from the District of Columbia Fire and Emergency Medical Services Department (FEMS). As a result of the accident, 91 people were injured, including passengers, emergency responders, and WMATA employees, and one passenger died.

Following the incident, the NTSB launched an investigation and as part of the investigation issued four early recommendations to WMATA (R-15-8, R-15-9, R-15-10 and R-15-25) pertaining to tunnel ventilation, procedures, training and inspection of power cables. A formal and public NTSB Investigative Hearing was held in June 2015. After completion of the hearing, WMATA was afforded an opportunity to review factual reports for technical accuracy. On May 3, 2016, the NTSB had conducted its public Board meeting to approve the official accident report and on May 23, 2016 WMATA received the official NTSB recommendations with request for response within 90-days. WMATA is still awaiting the release of the official report from the NTSB.

The report contains 43 findings and 31 total recommendations; 24 to the Authority and the remainder to external agencies. The NTSB stated the probable cause for Metro's fatal January 12, 2015 L'Enfant Plaza smoke incident was "a prolonged short circuit that consumed power system components" resulting from the transit agency's "ineffective inspection and maintenance practices." Those ineffective practices persisted as a result of the failure of senior Metro management to "proactively assess and mitigate foreseeable risk." Contributing to the incident were inadequate safety oversight by the Tri-State Oversight Committee and the Federal Transit Administration.

### **Discussion:**

The investigation of this accident noted a series of safety issues and conditions at WMATA that require immediate action. Issues ranging from initial response to smoke in a tunnel to rail car and tunnel and rail car ventilation to emergency response and insufficient oversight of WMATA. As a result, the NTSB issued safety recommendations to WMATA and a series of external agencies (the Federal Transit Administration, the Mayor of the District of Columbia, the District of Columbia Office of Unified Communications, the District of Columbia Fire and Emergency Medical Services Department, the National Capital Region Emergency Preparedness Council).

The NTSB investigation identified 43 findings:

1. Electrical arc tracking was aided by the presence of contaminants and moisture on third rail cables and inside cable connector assemblies.
2. WMATA's third rail electrical power cable systems are susceptible to electrical arc tracking at improperly constructed power cable connector assemblies, which can lead to short circuits that can generate fire and smoke in tunnels.

3. The electrical short circuit initiated from either the consumed or the damaged cable connector assembly.
4. Intrusion of water at the electrical arcing site contributed to the severity of the accident.
5. The electrical arcing that resulted in the consumption of the cables that were resting against the tunnel wall was the origin of the smoke at the accident location.
6. Including leak inspections with WMATA tunnel structural inspections was not effective in identifying leaks.
7. WMATA's tunnel repair program was not effective in mitigating recurring water intrusion like that found in the southbound Yellow Line tunnel.
8. Water intrusion into the Yellow Line tunnel south of L'Enfant Plaza predated the adjacent construction of the Wharf project, and therefore the construction was not a factor in the initiation of the electrical arcing.
9. WMATA did not have a written procedure for operating ventilation fans in response to smoke and fire events in a tunnel.
10. WMATA did not have effective training on the proper operation of tunnel ventilation fans.
11. WMATA failed to address the capacity problems of the ventilation system that were identified by engineering studies.
12. Had the maintenance procedures in place at the time of the accident been followed correctly, the fault in the remote control of the fans could have been identified and corrected during the scheduled monthly inspection.
13. The conditions discovered after the accident-the inability to execute remote commands to the tunnel ventilation system, the tripped overload breakers, the defective remote terminal unit card, and the deficient automatic transfer switch, automatic voltage regulator, and motor control center-resulted from WMATA's inadequate maintenance.
14. WMATA did not comply with its ventilation fan inspection and maintenance procedures.
15. WMATA was not following its tunnel-washing and insulator-cleaning procedure.
16. At the time of the accident WMATA did not have a procedure for train operators to follow that would immediately shut down the ventilation systems on all the railcars in a train.
17. When the operator of train 302 shut down the ventilation system, only the ventilation system on the leading railcar shut down immediately, and the

ventilation systems of all the other railcars remained operational.

18. The requirement for a train operator to receive permission from the Rail Operations Control Center to shut down the ventilation systems on a train, and the lack of a procedure for shutting down all the ventilation systems on a train from the lead railcar, contributed to the smoke entering the railcars in train 302.

19. The Rail Operations Control Center supervisor failed to ensure that the emergency procedures contained in Standard Operating Procedure #6 were followed by the control operators.

20. Had WMATA followed its standard operating procedures and stopped all trains at the first report of smoke, train 302 would not have been trapped in the smoke-filled tunnel.

21. WMATA put passengers at risk by routinely using trains with revenue passengers to investigate reports of smoke or fire.

22. The Rail Operations Control Center supervisor failed to ensure that all trains in both directions were stopped after smoke was reported, which was inconsistent with WMATA standard operating procedure.

23. Rail Operations Control Center supervisors and control operators were not proficient in executing emergency response procedures.

24. The Public Service Radio System communication problems were identified but not remediated before the accident.

25. WMATA's radio-testing procedure in place at the time of the accident was insufficient to identify Public Service Radio System communication problems in a timely manner.

26. Communications between the District of Columbia Fire and Emergency Medical Services Department (FEMS) liaison in the Rail Operations Control Center and the FEMS incident commander were delayed and inefficient.

27. The District of Columbia Office of Unified Communications' call processing delayed the emergency response to the accident.

28. Without line identification and direction signage at tunnel entrances and in tunnels, emergency response personnel may have difficulty navigating, which may delay their response efforts.

29. The lack of emergency lighting in the tunnel and the conduit and junction boxes on the tunnel wall above the walkway were safety hazards to passengers evacuating through the tunnel.

30. The lack of safety standards or regulation addressing emergency evacuation routes, including design and lighting, led to obstructed and poorly illuminated walkways at WMATA that increased the risk of injury to people evacuating train

302 in the Yellow Line tunnel.

31. The lack of formal training criteria for the battalion chief position may pose unnecessary risk with respect to incidents requiring the incident command process.

32. The incident commander had not been effectively trained in the skills and practices of the incident command process.

33. The incident commander should have elevated the incident response to a Unified Command structure.

34. In the initial phase of the emergency response, the incident commander did not take appropriate immediate action to provide emergency assistance to passengers on train 302.

35. Quarterly emergency response drills, particularly those in tunnels, would better prepare WMATA and local emergency response agencies to respond to emergencies on the WMATA system.

36. The District of Columbia Fire and Emergency Medical Services Department was unprepared to respond to a mass casualty event in the WMATA's underground system.

37. The WMATA missed the opportunity to improve its emergency response and procedures by not conducting an after-action review of its emergency response to the accident.

38. Despite its new authorities under the Fixing America's Surface Transportation Act, the Federal Transit Administration still lacks sufficient authority, expertise, and resources to assume temporary, direct safety oversight of rail transit agencies.

39. The structure of the Tri-State Oversight Committee (TOC) Executive Committee and its failure to effectively guide the TOC reduced the ability of the TOC to execute efficient and effective safety oversight of WMATA.

40. The projected establishment of the Metro Safety Commission will be delayed by the required legislation.

41. The WMATA has not effectively used past safety investigations, recommendations, and studies to make lasting changes that become incorporated into its organizational safety culture.

42. Although the WMATA has taken steps to improve its organizational safety since the 2009 Fort Totten accident, significant safety management deficiencies still exist within the organization.

43. Had WMATA effectively used its existing quality assurance program, it would have identified problems such as missing sealing sleeves and procedure non-compliance.

In the May 3, 2016 public meeting the NTSB Board approved the investigation report which included that the probable cause of the January 12, 2015 incident was identified as “a prolonged short circuit that consumed power system components resulting from the WMATA’s ineffective inspection and maintenance practices. The ineffective practices persisted as the result of (1) the failure of WMATA senior management to proactively assess and mitigate foreseeable safety risks, and (2) the inadequate safety oversight by the Tri-State Oversight Committee and the Federal Transit Administration. Contributing to the accident were WMATA’s failure to follow established procedures and the District of Columbia Fire and Emergency Medical Services Department’s being unprepared to respond to a mass casualty event on the WMATA underground system.”

There are 31 recommendations stemming from the approved investigation report. Two to the FTA, one to the Mayor of the District of Columbia, three to the District’s Office of Unified Command, one the District’s Fire and Emergency Medical Services and 24 to WMATA. The recommendations to WMATA are as follows:

1. Review and revise your tunnel inspection, maintenance, and repair procedures to mitigate water intrusion into tunnels (R-16-08).
2. When the revision of tunnel inspection, maintenance, and repair procedures recommended in Safety Recommendation R-16-08 has been completed, train maintenance employees on the new procedures, and ensure that the procedures are implemented (R-16-09).
3. Improve the capacity of tunnel ventilation fans to conform to the requirements of National Fire Protection Association (NFPA) 130 (R-16-10).
4. Develop location-specific emergency ventilation configurations based on engineering studies of the WMATA’s tunnel ventilation system (R-16-11).
5. Develop and implement procedures for actions to be taken by Rail Operations Control Center personnel when smoke detectors alarm (R-16-12).
6. Once action to address Safety Recommendation R-16-12 is completed, train all Rail Operations Control Center personnel on the new procedures for responding to smoke alarms. This training should include regular refresher training (R-16-13).
7. Incorporate smoke alarms in periodic emergency drills and exercises (R-16-14).
8. Include in your efficiency testing program (rules compliance testing program) a specific test to ensure appropriate emergency actions are taken by Rail Operations Control Center supervisors and control operators in response to an alarm (R-16-15).
9. Install and maintain a system that will detect the presence and location of fire and smoke throughout the WMATA’s tunnel and station network (R-16-16).
10. Develop procedures for regular testing of all smoke detectors (R-16-17).

11. Conduct a risk assessment before any preventive maintenance program is initiated, changed or discontinued (R-16-18).
12. Ensure that all train operators are trained and regularly tested on the appropriate procedure for emergency shutdown of railcar ventilation (R-16-19).
13. Incorporate a specific test in your efficiency testing program to ensure that train operators understand the procedure for emergency shutdown of railcar ventilation (R-16-20).
14. Revise Standard Operating Procedure #6 to clarify which trains should be stopped until the source of smoke is identified (R-16-21).
15. Revise your standard operating procedures to require that: (1) suitably trained, qualified, and properly equipped personnel investigate reports of wayside fire or smoke, and (2) these reports are not investigated using trains with revenue passengers (R-16-22).
16. Review and revise as necessary your ROCC emergency response procedures for smoke and fire (R-16-23).
17. Retrain Rail Operations Control Center supervisors on all standard operating procedures for emergencies (R-16-24).
18. Develop and incorporate a comprehensive program for training Rail Operations Control Center control operators in emergency response procedures including regular refresher training (R-16-25).
19. Conduct regular emergency response drills and develop a program to test the efficiency of the Rail Operations Control Center to ensure that standard operating procedures are properly followed during emergencies (R-16-26).
20. Install line identification and direction signage at tunnel entrances and inside tunnels (R-27-10).
21. Implement a regular schedule for the inspection and removal of obstructions from safety walkways and track-bed floors to ensure safe passageways for passengers to use during a tunnel evacuation (R-16-28).
22. Conduct emergency response drills with local emergency response agencies in accordance with National Fire Protection Association (NFPA) 130, document lessons learned, and develop and implement additional procedures as necessary to effectively respond to emergencies (R-16-29).
23. Revise your standard operating procedures to require that an after-action review be conducted of all emergency responses to events with passenger or employee fatalities, and publish the results, including both the successes and the potential deficiencies of your responses, to help ensure that deficiencies are appropriately remediated (R-16-30).

24. Review and revise your quality assurance program to ensure that regular quality assurance audits are included to identify and correct any elements of procedural noncompliance (R-16-31).

Currently these new recommendations are under various stages of review and development to determine appropriate actions. As each one is developed, the corrective action plans (CAPs) which will include at a minimum action owner(s), schedule, proposed budget and appropriate quality checks to ensure mitigation. All CAPs will be submitted to the NTSB for its approval. Upon approval and after mitigation actions are completed, proper documentation is required to be submitted to the NTSB for review and issuance of closure. To date, there are a total of 31 open NTSB recommendations.

**FUNDING IMPACT:**

Define current or potential funding impact, including source of reimbursable funds.	
Project Manager:	Pat Lavin
Project Department/Office:	SAFE Financial impact will be determine once corrective action plans are developed.

**TIMELINE:**

<b>Previous Actions</b>	<ul style="list-style-type: none"> <li>• Previous briefing May 12, 2016</li> </ul>
<b>Anticipated actions after presentation</b>	<ul style="list-style-type: none"> <li>• Develop corrective action plans and seek NTSB approval</li> <li>• Continue to fully implement all NTSB and FTA CAPs</li> <li>• Continue to strengthen safety culture</li> </ul>

**RECOMMENDATION:**

To inform the Board’s Safety Committee of the status of safety actions relative the NTSB Investigation Report.





**Washington Metropolitan Area Transit Authority**

# **NTSB Report of January 2015 L'Enfant Plaza Incident**

Safety Committee  
June 9, 2016



# Background

- NTSB is an independent investigatory agency placed within the Department of Transportation (DOT)
- Overall mission is to promote safety in transportation
  - Including investigating accidents and making recommendations
- Independent oversight agency
- 13<sup>th</sup> rail incidents investigated by the NTSB



# Background

- 101 safety recommendations since 1970
- 24 new recommendations on May 23, 2016
- Prior to May 23<sup>rd</sup>, WMATA had seven open and acceptable recommendations with the NTSB
  - Three related to previous incidents
  - Four related to L'Enfant Plaza Station
- The seven are hazard classified by WMATA as one Category 1, four Category 2, one Category 3 and one Category 4



# L'Enfant Plaza Incident

- On January 12, 2015 southbound Yellow Line train encountered smoke in the tunnel
- Southbound Yellow Line train was unable to return to station before loss of 3<sup>rd</sup> rail power
- Several passengers self-evacuated, others were assisted
- 91 individuals injured, 1 fatality



## NTSB Report – Probable Cause

“a prolonged short circuit that consumed power system components” resulting from the transit agency’s “ineffective inspection and maintenance practices,”



# NTSB Report - Findings

- Investigation revealed deficiencies:
  - Inspection and maintenance procedures
  - WMATA initial response to smoke
  - Tunnel ventilation system and procedures
  - Railcar ventilation procedures
  - Emergency response
  - Oversight and management
- Investigation identified 43 findings



# NTSB Recommendations Issued to Metro

NTSB issued 31, **24** to Metro:

- Current deliverables in support of closing FTA/TOC/internal CAPs can be directly tied to: **18**
- Procedural changes have been implemented, or are in development for: **5**





# NTSB Recommendations Issued to Metro

## Example:

NTSB R-16-24

*Retrain Rail Operations Control Center supervisors on all standard operating procedures for emergencies.*

## Related corrective actions:

- Early Action Safety Items
- NTSB R-15-9 & R-15-10
- FTA SMI CAPs
  - 1-2-A
  - 1-7-A
  - 1-12-A
  - 2-17-A, B & C
  - 5-35-A
- FTA Safety Directive 16-3





# NTSB Recommendations Issued to Metro

Example:

NTSB R-16-24

*Retrain Rail  
Operations Control  
Center supervisors on  
all standard operating  
procedures for  
emergencies.*

## Actions taken since Jan. '15:

- SOPs revised and reviewed by Emergency Mgt. (FTA SMI);
- Conditions requiring emergency action clarified (FTA SMI);
- Employees refreshed in SOPs as part of safety stand-down (FTA Safety Directive 16-3);
- ROCC and maintenance personnel retrained (FTA Safety Directive 16-3);
- New ROCC controller annual re-certification test under development (FTA SMI).



# NTSB Recommendations by Topic

Topic	Recommendations	Total
ROCC	16-12; 16-13; 16-15; 16-21; 16-23; 16-24; 16-25	7
Emergency Management	16-26; 16-27; 16-28; 16-29; 16-30	5
Smoke Detection/Alarms	16-14; 16-16; 16-17	3
Train Operation	16-19; 16-20; 16-22	3
Tunnel Inspection/Maintenance	16-08; 16-09	2
Tunnel Ventilation	16-10; 16-11	2
Other	16-10*; 16-18**	2
		<b>24</b>

\* Improve ventilation fan capacity to conform to the requirements of NFPA 130. Major Capital Item

\*\* Conduct risk assessment before any preventive maintenance program is initiated/changed.



## Next Steps

- Cross reference all recommendations/deficiencies
- Develop detailed corrective action plans
- Identify financial impact
- Submit for NTSB approval by August 20, 2016