

PS & T&E COMMITTEES #1  
March 24, 2015

**MEMORANDUM**

March 20, 2015

TO: Public Safety (PS) Committee  
Transportation, Infrastructure, Energy and Environment (T&E) Committee

FROM: Glenn Orlin, Deputy Council Administrator

SUBJECT: **Briefing**—January 12 Metrorail incident near L’Enfant Plaza Metro Station

In the afternoon of January 12, 2015 an incident occurred on Metrorail train in the tunnel between the L’Enfant Plaza Station and the Potomac River Bridge, resulting in a passenger fatality, two riders critically injured, and more than 80 others transported to local medical facilities for treatment. The incident is under investigation by the National Transportation Safety Board (NTSB). The PS and T&E Committee Chairs requested a briefing on the incident and corrective actions underway. A statement by the Washington Metropolitan Area Transit Authority (WMATA) is on ©A-B. The briefing will be led by Kevin Gaddis, Deputy Chief of Metro Transit Police.

For background, attached are: a January 23 report on the incident by the District of Columbia Homeland Security and Emergency Management Agency (©1-9); NTSB’s preliminary report after the incident (©10-13); and NTSB’s February 11 letter describing its three urgent safety recommendations (©14-17).

## **WMATA RESPONSE TO L'ENFANT PLAZA SMOKE INCIDENT**

An investigation by the National Transportation Safety Board (NTSB) is underway, and Metro is fully engaged and cooperating with the effort. Metro recognizes that a complete and impartial review depends upon confidentiality – Metro is following the ground rules laid out by the NTSB.

Metro has provided NTSB investigators with access to conduct several track walks and examine equipment, and has submitted more than 780 documents containing 11,200 pages of information, including: 372 hours of surveillance video, 300 photographs, fire alarm records, equipment maintenance records, training and operations records, and passenger and witness statements.

The NTSB has issued its first recommendations to Metro and the entire industry, concerning training and inspection of tunnel ventilation systems. In line with those recommendations, Metro has already conducted a thorough test of our subway tunnel ventilation system and provided familiarization training for all 39 controllers at our Rail Operations Control Center. Metro is now in the process of developing additional protocols and training associated with tunnel fan use that are responsive to the NTSB recommendations.

As the NTSB continues its review; Metro is not waiting. Since the January 12<sup>th</sup> incident, Metro has taken action to address 10 early safety items, with some matters requiring follow-up work that is now underway. Metro has designed and started installation of new signage on the outside of all railcars to clearly identify emergency doors and release handles for first responders who may not be familiar with Metro evacuation procedures. Metro train operators have been given independent authority to operate the air intake systems on their railcars, and the protocols for employees at our rail control center have been streamlined to prevent unnecessary distractions. Additionally, Metro is working with the American Public Transit Association to begin a peer review of the rail operations control center in the next month.

As another early action, Metro's Office of Emergency Management has created an enhanced schedule for full-scale emergency drills to be conducted over the next three years in all of the local jurisdictions. These drills will supplement the regular schedule of trainings, which already includes at least one full-scale drill a year. These drills bring multiple jurisdictions and law-enforcement agencies together to test response capabilities, build coordination and provide an opportunity to practice unified command in a real-life setting.

Metro is also working with the fire chiefs from all of the local jurisdictions, through the Metropolitan Washington Council of Government (COG) to establish formal radio testing and reporting protocol within the Metro system. Each jurisdiction has its own radio system operating inside Metrorail tunnels, independent of the system used by Metro employees. And while the jurisdictions are responsible for their own testing, there have historically been no formalized testing schedules or reporting requirements. Metro and its regional partners are actively working to address those shortcomings.

Lastly, FTA's Safety Management inspection is underway, and we expect their report to be issued by the end of May. The FTA has so far expressed appreciation for Metro's cooperation in the process and Metro will continue working openly and supportively as they complete the review.

## Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015

### Executive Summary

On Monday, January 12, 2015, rescue personnel from the District of Columbia Fire and Emergency Medical Services (FEMS) Department responded to reports of smoke at the L'Enfant Plaza Metro Station. When they arrived, they discovered that a six-car Yellow Line Metro train with passengers was stopped in the tunnel approximately 386 feet from the end of the platform. Working with personnel from the Metro Transit Police Department (MTPD) and the Metropolitan Police Department (MPD), FEMS evacuated passengers, triaged those in need of medical attention, and transported 84 patients to hospitals. One passenger died.

This report, compiled by the District's Homeland Security and Emergency Management Agency, summarizes the facts known about the event at the present time and highlights initial findings. It based on data from the following sources:

- Office of the Chief Medical Examiner Incident After-Action Report: L'Enfant Metro Fire, released January 15, 2015;<sup>1</sup>
- Washington Regional Threat Analysis Center Timeline: Metro Incident, released January 16, 2015;<sup>2</sup>
- National Transportation Safety Board (NTSB) Preliminary Report: WMATA Smoke and Electrical Arcing Accident in Washington, DC, released January 16, 2015;<sup>3</sup>
- Initial Report by the Fire and Emergency Medical Services Department on the L'Enfant Plaza Metro Station Incident of January 12, 2015, released January 17, 2015;<sup>4</sup>
- Computer-Aided Dispatch (CAD) event chronologies provided by the Office of Unified Communications (OUC);
- Recordings of 9-1-1 calls<sup>5</sup> and radio communications provided by OUC; and
- Interviews with FEMS and OUC personnel.

## Event Overview

*As the after action reporting process continues, more information will be gathered to further validate the timeline and events that took place.*

The following narrative is organized into three phases:

- Notification and Response

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<sup>1</sup> See Attachment A.

<sup>2</sup> See Attachment B.

<sup>3</sup> See Attachment C.

<sup>4</sup> See Attachment D.

<sup>5</sup> See Attachment E.

## **Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015**

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### **Executive Summary**

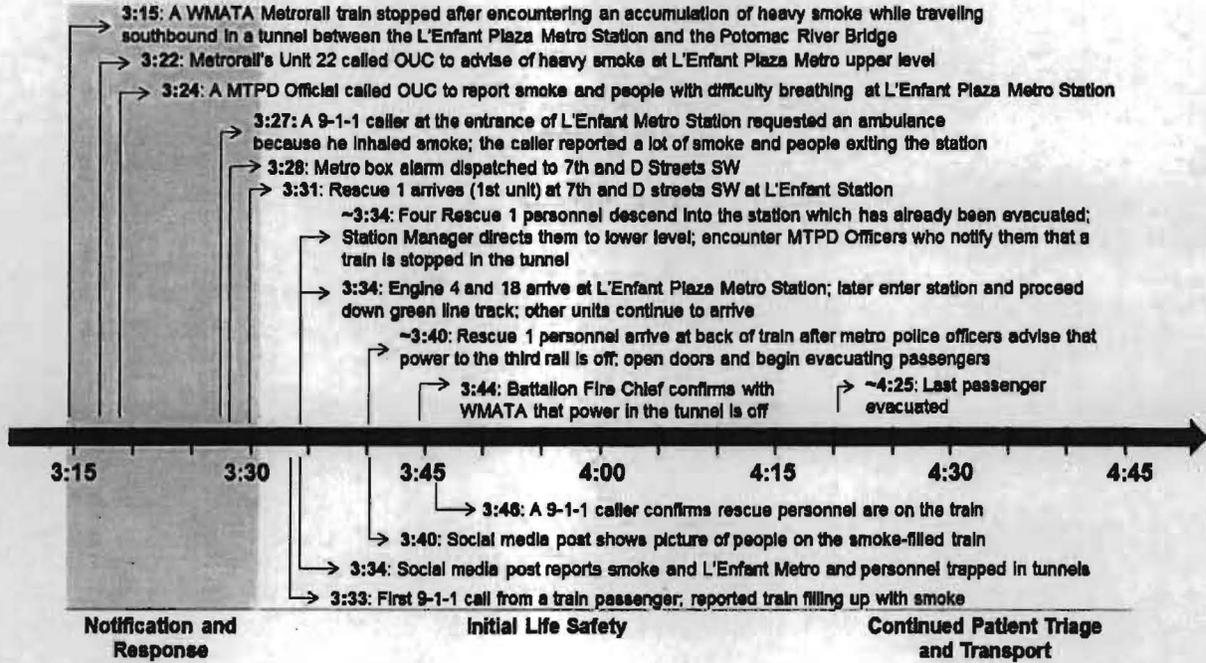
- **Initial Life Safety Operations**
- **Continued Patient Triage and Transport, and Recovery**

The figures on the next page display a high level timeline of key events, as well as a map of key locations referenced in the narrative.

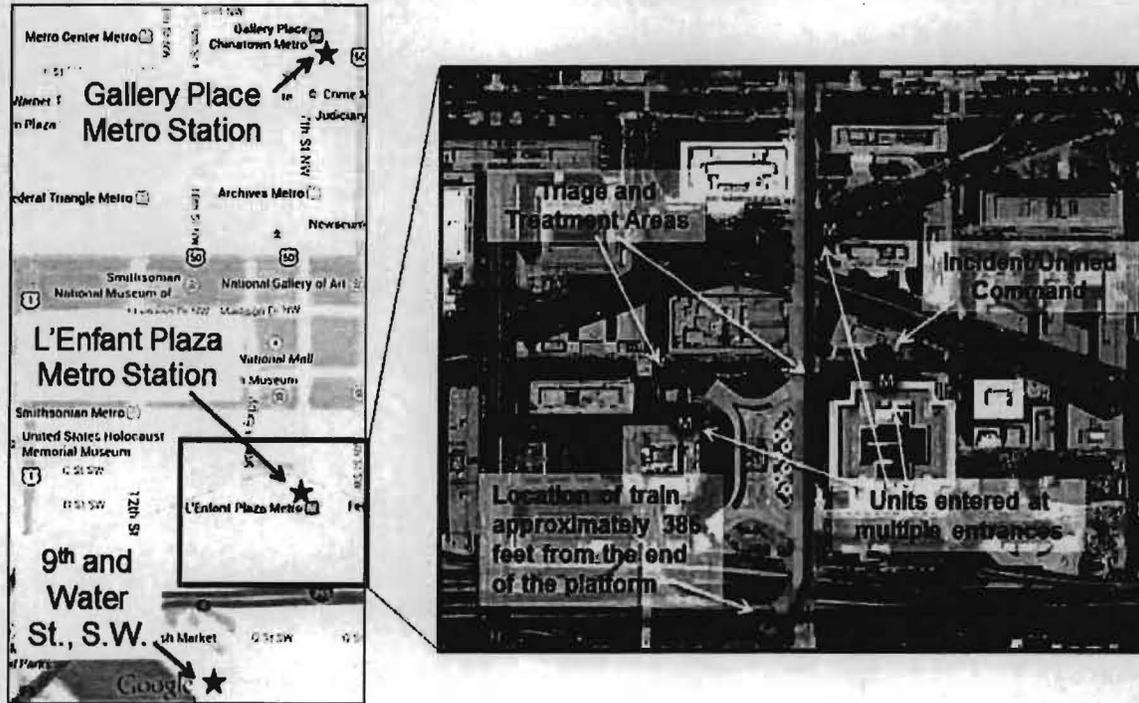
# Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015

## Executive Summary

**Figure 1. Key Event Overview**



**Figure 2. L'Enfant Plaza Metro Station**



## Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015

### Executive Summary

#### **Notification and Response**

According to the NTSB's Preliminary Report, an electrical breaker at one end of a section of third rail tripped (opened) at 3:06 p.m. on January 12, 2015, causing electrical arcing and smoke.

At 3:14 p.m., an OUC supervisor received a call from a WMATA supervisor in Metro Rail Unit 22 reporting a debris fire on the tracks at Gallery Place-Chinatown Metro Station. It is not known whether this call was related to the electrical arcing.

About one minute later, a WMATA Metrorail train stopped after encountering an accumulation of heavy smoke while traveling southbound in the Yellow Line tunnel between the L'Enfant Plaza Metro Station and the Potomac River Bridge. After stopping, the rear car of the train was about 386 feet from the south end of the L'Enfant Plaza Metro Station platform.

At 3:18 p.m., OUC received a 9-1-1 call from a construction worker reporting smoke coming out of the WMATA tunnel ventilation shaft at 9<sup>th</sup> Street and Water Street, SW.

At 3:19 p.m., OUC dispatched Engine 2 to the Gallery Place Metro Station. Engine 2 arrived on scene at 3:22 p.m.

At 3:22 p.m., OUC dispatched Truck 10 and Engine 13 to 9<sup>th</sup> and Water Street, SW. At the same time, the OUC supervisor received a call from Metro Rail Unit 22 reporting heavy smoke at the L'Enfant Plaza Metro Station. The OUC supervisor advised Unit 22 that OUC would have a unit respond. This call lasted 90 seconds. About 30 seconds after the end of this call, at 3:24 p.m., the OUC supervisor received another call from a MTPD official at L'Enfant Plaza Metro Station requesting medics. He said there was smoke in the station and people who could barely breathe. Neither call was to a 9-1-1 operator. The OUC supervisor entered information about both calls into the CAD system.

At 3:25 p.m., Truck 10 and Engine 13 arrived on scene at 9<sup>th</sup> and Water Street, SW. The units reported that they smelled smoke emanating from the ventilation shaft. Meanwhile, another train moving on the same track behind the stopped train in the Yellow Line tunnel stopped at the L'Enfant Plaza Metro Station platform and encountered heavy smoke.

At 3:27 p.m., OUC received a 9-1-1 call from a person at the entrance of the L'Enfant Plaza Metro Station. He requested help for smoke inhalation and reported the smoke, as well as people exiting the station. OUC advised that help was en route.

At 3:28 p.m., while the 9-1-1 operator was still talking with the caller, OUC dispatched a Metro Station Box Alarm to the L'Enfant Plaza Metro Station, which consists of the following FEMS units:

- 5 Engine Companies;
- 2 Ladder Trucks;
- 2 Battalion Fire Chiefs;
- 1 Battalion Fire Chief to WMATA Operations Command Center (in Landover, MD);

## Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015

### Executive Summary

- 1 Heavy Rescue Squad;
- 1 Basic Life Support Unit;
- 1 Advanced Life Support Unit; and
- 1 Emergency Medical Services Supervisor.

At approximately 3:30 p.m., FEMS responders at 9<sup>th</sup> and Water Street, SW observed two individuals in the ventilation shaft who had apparently self-evacuated from the Metro train in the Yellow Line tunnel. The responders notified their Battalion Fire Chief, opened the ventilation shaft doors, and descended approximately 50 to 75 feet to assist and evacuate the two individuals.

At 3:31 p.m., Rescue 1 arrived at the L'Enfant Plaza Metro Station. They entered the Metro station and found it was evacuated. The Metro train that entered the station at approximately 3:25 p.m. was parked at the platform and empty, its passengers and operator already evacuated. Four rescue personnel entered the station and encountered the Metro Station Manager, who told them to go down the escalator to the end of the platform. At the end of the platform, they met four MTPD officers who told them that there was a train with passengers stopped in the tunnel. There was heavy smoke on the platform and in the tunnel. The rescue personnel asked the MTPD officers if power to the third rail<sup>6</sup> was off. An MTPD officer spoke to someone on his radio and confirmed that the power was off. Rescue 1 attempted to notify the Battalion Fire Chief, but their radios did not work. The rescue personnel entered the tunnel on the catwalk. As they walked, they hit the blue box station emergency trip switches, which also cut power to sections of the third rail.<sup>7</sup>

At 3:33 p.m., OUC received the first 9-1-1 call from a passenger on the train and advised the caller that rescue units were at the scene. At about the same time, additional FEMS units arrived, entering the station through other entrances.

At 3:35 p.m., after finding no evidence of a fire at the Gallery Place-Chinatown Metro Station, Engine 2 cleared the scene and was dispatched to the L'Enfant Plaza Metro Station.

At approximately 3:40 p.m., rescue personnel reached the back of the Metro train in the Yellow Line tunnel.<sup>8</sup> Because of the heavy smoke, they could not see the train until they were right next to it.

### **Initial Life Safety Operations**

Rescue personnel asked the passengers to open the side door, but the passengers could not open it, so rescue personnel opened the doors with keys that they carry<sup>9</sup>. Two rescuers

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<sup>6</sup> The third rail supplies power to the trains.

<sup>7</sup> In interviews, rescue personnel said that the initial responders did not wait to receive confirmation from the Battalion Fire Chief that power to the third rail was off and that train movement had stopped, and they did not test the third rail with a volt probe. Both of these provisions are required by FEMS and Metro safety guidelines.

<sup>8</sup> This time is based on initial interviews with FEMS responders about their recollection of events.

<sup>9</sup> Based on information provided in an interview of FEMS Rescue 1.

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### Executive Summary

entered the train to start triage and evacuate passengers. They found an unconscious passenger who they carried off the train and passed to two other rescuers, who carried her to the platform. On the train, rescuers began evacuating passengers, who exited the train and walked to the platform on the catwalk. At 3:46 p.m., a 9-1-1 caller reported seeing a firefighter on the train.<sup>10</sup>

Meanwhile, the rescuers on the platform checked the condition of the unconscious woman. Finding she had a pulse, two rescue personnel carried her out of the station, stopping to check her pulse along the way. Once outside of the station, she no longer had a pulse, and they began CPR. They called for an ambulance, which OUC dispatched at 4:06 p.m.,<sup>11</sup> and they continued CPR until the Advanced Life Support ambulance arrived. Emergency medical personnel took over and the rescuers returned to the tunnel. The ambulance reported it was en route to the hospital at 4:28 p.m.<sup>12</sup>

Additional units and resources continued to arrive at the platform and train. Some response personnel entering from other locations ended up on other platforms. Personnel responding with Engine 18 entered the tunnel on the platform opposite of Rescue 1. Not knowing the location of the train, they traveled into the Green Line tunnel at the split and doubled back when they didn't find the train there. FEMS established a unified command that included MTPD and MPD outside the L'Enfant Plaza Metro Station entrance.

OUC continued to receive 9-1-1 calls from several passengers, as passengers at the front of the train did not know that rescue personnel had arrived. Rescuers estimate that it took about 45 minutes to clear the entire train from the time they reached it. The evacuation required passengers to walk single-file down the catwalk through heavy smoke. There was a significant gap between the train and catwalk, so some passengers had difficulty making their way from the train to the catwalk. FEMS rescue personnel estimate that evacuation was completed by 4:25 p.m.

At 4:12 p.m., FEMS requested that OUC deploy the radio cache.<sup>13</sup> OUC estimates that the cache arrived between 4:50 and 5:00 p.m., however it was not needed.

The Office of the Chief Medical Examiner was notified of the event at 4:36 p.m.

### **Continued Patient Triage and Transport, and Recovery**

According to mass casualty protocols, FEMS personnel established two triage and treatment sites outside the L'Enfant Plaza Metro Station where they triaged injured passengers and transported injured patients to hospitals. In total, FEMS transported 84 patients to District hospitals.

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<sup>10</sup> The source for this time is the recording of the 9-1-1 call.

<sup>11</sup> The source for this time is the OUC CAD event chronology.

<sup>12</sup> The source for this time is OUC radio recordings.

<sup>13</sup> The radio cache is used to lend radios to responders from other agencies or jurisdictions so they can communicate with FEMS during a response.

## **Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015**

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### **Executive Summary**

At 6:09 p.m., FEMS turned the site over to the Metro Transit Police Department.

At 6:30 p.m., the MPD Natural Squad<sup>14</sup> was notified of the fatality and began the identification and notification process.

At 7:15 p.m., MTPD reported that according to the preliminary investigation, the cause of the fire and smoke appeared to be related to a WMATA equipment issue.

At 8:00 p.m., the National Transportation Safety Board (NTSB) took over responsibility for the investigation.

### **Initial Findings**

Below are initial findings that focus on two preliminary areas of concern and are based only on the information available thus far. As more information becomes available, these findings will be further analyzed and refined. The continuing after action process will also provide recommendations and corrective actions.

#### **Communication**

- Radio communication worked sporadically. Once Rescue 1 entered the Metro Station via the L'Enfant Plaza escalator, they were told by MTPD that there were passengers stranded in the Yellow Line tunnel and about power to the third rail. This information may not have been known to other response personnel at that time. Since radio communication worked sporadically during the incident, Rescue 1 was not able to relay that information to the Battalion Fire Chief and other response personnel. Personnel responding with Engine 18 entered the tunnel on the platform opposite Rescue 1. Engine 18 traveled into the Green Line tunnel and doubled back when they did not find a train there.
- As a result of sporadic radio communication, responders used alternative methods of communication, such as runners and face-to-face communications, the talk-around feature on their radios, and cellphones to communicate with other responders in the Metro station, tunnel, and those above ground outside the station.
- Based on the currently available information, the FEMS radio encryption function does not appear to have played a role in the communications difficulties experienced by FEMS personnel inside the L'Enfant Plaza Metro Station and tunnel when trying to communicate with other FEMS personnel.
- Initial communication to OUC lacked information regarding passengers onboard a train stopped in a tunnel. In response to the first calls to OUC which indicated only fire and smoke, OUC dispatched a Metro Station Box Alarm.

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<sup>14</sup> MPD's Natural Squad conducts death investigations.

## **Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015**

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### **Executive Summary**

#### **Response Times and Procedures**

- FEMS and Metro safety guidelines for entering the track bed include multiple provisions that take time to complete. The safety guidelines advise that no one shall enter the track bed until all of the following provision are met: Permission has been granted by the Incident Commander; Metro – via the Battalion Fire Chief – has confirmed that all power has been turned off and that all train movement in the area has stopped; the emergency trip switches have been pushed for all affected stations of track; and the third rail has been tested with a volt probe. Rescue personnel did not wait to complete all of these steps before entering the tunnel. Instead, they confirmed with the MTPD officers at the scene that power was off and hit the emergency trip switches as they entered the tunnel. Due to the issues with the radio communication, the normal confirmation via the Battalion Fire Chief was not performed.
- Doors on the 3000-series Metro cars were difficult for rescue personnel to open. Rescue 1 personnel asked passengers to open the side door, but passengers could not. Instead, rescue personnel used specialty keys they carry to open the doors and gain access to the train.

#### **Radio Testing**

OUC recently transitioned FEMS from analog radios to Motorola P25 digital radios which have expanded capabilities, allow for a high degree of interoperability, and have encrypted radio channels. For the past two years, in preparation for this transition, OUC has coordinated with WMATA to conduct approximately 600 P25 radio tests in every Metro station located in the District. Early tests identified some connectivity issues which were fixed in 2013. OUC transitioned FEMS to the P25 system in December of 2014; subsequent testing showed that the radios worked, but experienced some limited failures interacting with Metro's radio system.

The most recent tests before the January 12 incident occurred on December 8, 2014 in three Metro stations: Benning Road, Stadium-Armory, and Potomac Avenue. Test results showed radios worked at the kiosks, platforms, and tunnels in all three Metro stations, with the exception of the Stadium-Armory tunnel areas where the transmission was intermittent. An additional test was performed by FEMS on January 8, 2015 in the L'Enfant Plaza Metro Station which found that the P25 radios were not working properly with the WMATA radio system. WMATA was notified of the issue, but repairs were not made prior to the January 12 incident.

Since the incident, OUC, in conjunction with WMATA, has been performing system wide re-tests. These tests – which OUC is conducting on a daily basis – are more thorough and include detailed receive signal strength measurement at every Metro station using spectrum analyzers, including uplink and downlink measurements, as well as audio quality checks at the platform and tunnel areas. The tests examined the P25 radios and their interaction with the Metro radio system in the Metro stations and tunnels within the District. At the time of

## **Initial Report on the L'Enfant Plaza Metro Station Incident on January 12, 2015**

### **Executive Summary**

this report's publication, OUC had tested the majority of Metro stations in the District and found two instances of WMATA radio communications failures, both of which were referred to WMATA for corrective action. This information has been shared with DC FEMS so they can appropriately respond in case of emergency.

The system wide test is scheduled to be completed by January 24, 2015. Typically, OUC conducts monthly tests, but at the direction of the Mayor, moving forward OUC will conduct weekly tests throughout the Metro system until system reliability is sustained.

### **Conclusion and Next Steps**

In the coming weeks, the District of Columbia Homeland Security and Emergency Management Agency will continue to engage all District agencies involved in the January 12 response as part of a comprehensive after-action review and will release a more-detailed After-Action Report with recommendations and corrective actions.

It is important to consider the potential for larger, more complicated incidents to occur in the future, where agency roles and responsibilities may be stressed in more challenging ways. The District should be proud of the response that its employees and citizens delivered on January 12, but it should also recognize the need for an ongoing commitment to continually build and test capabilities through training, exercises, and real-world event responses.



# **Preliminary Report Railroad DCA15FR004**

*The information in this report is preliminary and will be supplemented or corrected during the course of the investigation.*

On January 12, 2015, about 3:15 p.m. eastern standard time, Washington Metropolitan Area Transit Authority (WMATA) Metrorail train 302 stopped after encountering an accumulation of heavy smoke while traveling southbound in a tunnel between the L'Enfant Plaza Station and the Potomac River Bridge. After stopping, the rear car of the train was about 386 feet from the south end of the L'Enfant Plaza Station platform.

A following train, stopped at the L'Enfant Plaza Station at about 3:25 p.m., and was also affected by the heavy smoke. This train stopped about 100 feet short of the south end of the platform. Passengers of both trains, as well as passengers on the station platforms, were exposed to the heavy smoke.

Both Metrorail trains involved in this incident consisted of six passenger cars and were about 450 feet in length. As a result of the smoke, 86 passengers were transported to local medical facilities for treatment. There was one passenger fatality and two passengers were hospitalized in critical condition.



**Figure 1.** Damage from the arcing incident in the tunnel near L'Enfant Plaza Station.

NTSB investigators have inspected the area of the incident, where they observed severe electrical arcing damage to the third rail and electrical cables about 1,100 feet ahead of train 302. Recorded data shows that at about 3:06 p.m., an electrical breaker at one end of a section of third rail tripped (opened). At about 3:16 p.m. the WMATA Operations Control Center (OCC) began activating ventilation fans in an effort to exhaust smoke from the area. The electrical breaker at the other end of the third rail section remained closed; supplying power until the WMATA OCC remotely sent a command to open the breaker at about 3:50 p.m.



**Figure 2.** Damage from the arcing incident in the tunnel near L'Enfant Plaza Station.

NTSB investigators are reviewing maintenance records of track, signal and power inspections, and railcar vehicles; documentation on previous events with smoke generation; maintenance and repair records of the tunnel exhaust fan/ventilation operations; WMATA emergency response and evacuation plans; and employee training records. Investigators have also collected material samples from the incident site and are examining the samples at the NTSB Materials Lab. In addition, NTSB investigators are currently conducting interviews with personnel involved, and have begun the collection and review of all available surveillance video.

The NTSB has formed the following technical investigative working groups:

- Operations
- Survival Factors
- Fire Science
- Signal and Power
- Track
- Civil Engineering/Infrastructure
- Mechanical/Equipment
- Recorders

The NTSB Transportation Disaster Assistance Division is providing support to the WMATA victim assistance team.

Parties to the investigation include: the Federal Transit Administration, Tri-State Oversight Committee, Washington Metropolitan Area Transit Authority, Amalgamated Transit Union Local 689, and the Bureau of Alcohol, Tobacco, Firearms and Explosives.



**National Transportation Safety Board**  
Washington, DC 20594

**Safety Recommendation**

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**Date:** February 11, 2015

**In reply refer to:** R-15-8 through -10 (Urgent)

Mr. Jack Requa  
Interim General Manager and Chief  
Executive Officer  
Washington Metropolitan Area Transit  
Authority  
600 5th St. NW  
Washington, DC 20001

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The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents and issue safety recommendations aimed at preventing future accidents. In addition, we carry out special studies concerning transportation safety and coordinate the resources of the federal government and other organizations to provide assistance to victims and their family members affected by major transportation disasters.

We urge the Washington Metropolitan Area Transit Authority (WMATA) to take action on the urgent safety recommendations issued in this letter. These recommendations address the WMATA emergency response to smoke in subway tunnels and are derived from our ongoing investigation of the electrical arcing and smoke accident near the WMATA L'Enfant Plaza station in Washington, D.C., on January 12, 2015. Facts supporting these recommendations are discussed below.

**Background**

On January 12, 2015, at 3:15 p.m., eastern standard time, southbound WMATA Metrorail train 302 stopped after encountering heavy smoke in a subway tunnel between the L'Enfant Plaza station and the Potomac River bridge. After stopping, the rear car of the train was about 386 feet from the south end of the L'Enfant Plaza station platform. The train operator contacted the WMATA Operation Control Center (OCC) to announce that the train was stopped due to heavy smoke.

A following train (train 510), which was stopped at the L'Enfant Plaza station at 3:25 p.m., also was affected by the heavy smoke. This train stopped about 100 feet short of the south end of the platform, but its cars were entirely within the station. Train 510 was evacuated while it was stopped at the station platform.

Police officers provided assistance in guiding passengers from the underground platform to the surface. Some of the passengers aboard train 302 self-evacuated. Emergency responders were dispatched to the scene and assisted evacuating passengers from both trains, as well as the station.

Both Metrorail trains had six passenger cars. The length of each train was about 450 feet. As a result of the smoke, 86 passengers were transported to local medical facilities for treatment. One passenger fatality occurred. Initial damages were estimated by WMATA to be \$120,000.

The parties to the investigation include the Washington Metropolitan Transit Authority; the Federal Transit Administration; the Tri-State Oversight Committee; the Bureau of Alcohol, Tobacco, Firearms and Explosives; the Amalgamated Transit Union, Local 689; the International Association of Fire Fighters, Local 36; the District of Columbia Fire and Emergency Medical Services Department; and the District of Columbia Metropolitan Police Department.

Although the NTSB investigation is still in the early stages, we have identified safety issues that require immediate attention and are making one urgent safety recommendation to the Federal Transit Administration, three urgent safety recommendations to WMATA, and two urgent safety recommendations to the American Public Transportation Association.

## **Discussion**

The WMATA subway system has ventilation fans at strategic locations to remove smoke and heat from the tunnels. These fans can be operated in either a supply mode that pulls fresh air into the tunnels and stations or an exhaust mode that pulls air from the tunnels and stations to the outside. The fans can be operated either remotely from the WMATA OCC or locally from control panels near the fans.

Smoke was not present as train 302 departed the L'Enfant Plaza station. After encountering heavy smoke, the train operator stopped the train with the lead car about 836 feet beyond the south end of the station. At 3:16 p.m., the WMATA OCC activated the under-platform fans in the exhaust mode at the L'Enfant Plaza Green and Yellow Line platforms. The location of these under platform fans was behind the stopped train 302. This action pulled smoke toward trains 302 and 510 from the electrical arcing event that caused the smoke. The source of the smoke was later determined to be about 1,100 feet ahead (south) of train 302.

A vent shaft with additional ventilation fans was about 24 feet ahead (south) of the source of the smoke. At 3:24 p.m., these ventilation fans, which are about 1/3 mile south of L'Enfant Plaza station, were activated in exhaust mode. At this point train 302 was already blanketed with smoke. Also, the train ventilation system that draws air from the outside into the cars was not shut off by the train operator. Existing WMATA procedures required the train operator to receive permission from the OCC to shut off the train ventilation system. Because both the station and vent shaft fans were all activated in exhaust mode, there was not a supply of fresh air to aid in moving the smoke through the tunnel to the exhaust.

A smoke detector located at the bottom of the vent shaft near the location of the heavy smoke activated at 3:04 p.m. Smoke detectors in the service rooms located southwest of the L'Enfant Plaza station platform activated at 3:19 p.m. and 3:20 p.m.

The vent shaft near the source of the smoke contained four fans. Each fan had a rated capacity of 50,000 cubic feet per minute (air flow). NTSB investigators found during post-accident inspection that two of the four fans had tripped an overload circuit breaker and were non-operational. This means that either (1) only two of the four fans were operational during the accident or (2) two of the fans became non-operational sometime during the accident.

Currently, WMATA does not have the means to determine the exact location of a source of smoke in their tunnel network. However, the initial reports from the train operator suggested that the smoke was ahead of train 302, since the train had travelled from a smoke-free environment into a smoke-filled environment.

The OCC rail controllers are guided by various emergency Standard Operating Procedures (SOPs). WMATA SOP No. 6, *Smoke and Fire on The Roadway*, contains a number of key actions that must be taken when a train encounters smoke in a tunnel. This SOP does not address tunnel ventilation strategies. Other transit agencies (such as the San Francisco Bay Area Transit District) have developed detailed ventilation procedures for addressing train fires and smoke events in tunnels. A common approach in these tunnel ventilation procedures is (1) to identify the most likely location of the smoke or fire, (2) to start the ventilation fans on one side of the smoke or fire in supply mode, and (3) to start the ventilation fans on the other side in exhaust mode. This strategy is designed to move smoke away from the passengers and the evacuation route. Once implemented, the controllers are to check with personnel at the site to verify the ventilation fans are properly working and to make any necessary adjustments.

WMATA told the NTSB investigators that the OCC controllers are trained on ventilation procedures and on the strategy of using ventilation fans in supply and exhaust modes to provide air to passengers. WMATA told the NTSB investigators that since this accident it has re-trained its controllers on the proper operation of tunnel ventilation fans. However, during the investigation, the NTSB investigators determined (1) WMATA does not have a written ventilation procedure for smoke and fire events in a tunnel, and (2) the ventilation strategy implemented during this accident was not consistent with best practices. This issue is critical because SOPs, which are readily available to the controllers, can serve as a checklist during an emergency.

The safety issue the NTSB has identified involve the absence of a written procedure that addresses ventilation procedures during smoke and fire events in tunnels. This vulnerability needs to be immediately addressed by WMATA and the rail transit industry. Therefore, the NTSB makes the following urgent safety recommendations to the WMATA:

R-15-8

Assess your subway tunnel ventilation system to verify the state of good repair and compliance with industry best practices and standards, such as those outlined in the National Fire Protection Association's NFPA 130,<sup>®</sup> *Standard for Fixed Guideway Transit and Passenger Rail Systems*.<sup>®</sup> (Urgent)

R-15-9

Develop and implement detailed written tunnel ventilation procedures for operations control center staff that take into account the probable source location of smoke and fire, the location of the train, the best evacuation route, and unique infrastructure features; these procedures should be based on the most effective strategy for fan direction and activation to limit passengers' exposure to smoke. (Urgent)

R-15-10

As part of the implementation of the procedures developed in response to Safety Recommendation R-15-009, incorporate the use of the procedures into your ongoing training and exercise programs and ensure that operations control center staff and emergency responders have ample opportunities to learn and practice activating ventilation fans. (Urgent)

We also issued one urgent safety recommendation to the Federal Transit Administration and two urgent safety recommendations to the American Public Transportation Association.

Acting Chairman HART and Members SUMWALT and WEENER concurred in these recommendations.

We are vitally interested in these recommendations because they are designed to prevent accidents and save lives. We would appreciate receiving a response from you within 30 days detailing the actions you have taken or intend to take to implement them. When replying, please refer to the safety recommendations by number. We encourage you to submit your response electronically to [correspondence@ntsb.gov](mailto:correspondence@ntsb.gov).

[Original Signed]

By: Christopher A. Hart,  
Acting Chairman