



WMSC Commissioner Brief: W-0189 – Evacuation for Life Safety Reasons – Ballston-MU Station – August 11, 2022

Prepared for Washington Metrorail Safety Commission meeting on December 13, 2022

Safety event summary:

Toxic hydrogen sulfide gas from overheated Metrorail batteries filled parts of Ballston-MU Station on August 11, 2022.

Initially, a Metrorail fire alarm in the station activated around 9:15 p.m. This alarm reached the Station Manager and personnel in the Rail Operations Control Center (ROCC). Later response from Metrorail and the Arlington County Fire Department determined that it was not a fire, but instead the gas originating in battery room 121 at the southeast end of the platform that was causing the hazardous condition. Fire department personnel waited approximately 20 minutes to enter the room while waiting for WMATA personnel with a key¹, before eventually forcing entry to the room. Per WMATA policy, keys to traction power and battery rooms are not kept in the Knox Box. However, there is a Battery Safety Switch outside of the room that can be used to cut off power to the battery room, that personnel were unaware of.

A Rail Supervisor had arrived at the station 11 minutes before the fire department forced entry into the room, which has restricted access for Metrorail personnel due to it being a battery room. After entering the room, Arlington County Fire upgraded the response to a hazmat response. At that point, 47 minutes after the initial alarm, Arlington County Fire and Metro Transit Police requested trains bypass the station and customers be evacuated. During the time that the station was evacuated and closed to riders, Metrorail had trains continue through the station without stopping. Train Operators were instructed to turn off their train's Environmental Ventilation systems (HVAC). However, one of those trains stopped and serviced the station, leading to a rider exiting the train into hazardous conditions.

Metrorail did not follow its emergency response procedures during this event. Metro Transit Police Department (MTPD) personnel established an incident command post even though Arlington County Fire personnel were already on scene. Metrorail also had unnecessary personnel in the station during the evacuation rather than maintaining an appropriate staging area. In addition, Metrorail did not ensure that a fire alarm in a battery room was initially treated as a potential hazmat condition, even when an electrical mechanic arrived who is trained on the equipment.

Arlington County Fire communicated by 9:24 p.m. that the alarm was in Room 121. Metrorail personnel could not provide access, and the fire department later forced its way into the room by 9:48 p.m. It is not clear that fire department or other personnel knew of this access, as later communication with the Fire Liaison in the ROCC continued to discuss access. The Fire Liaison was also not made aware of other updates regarding the locations of Metrorail power personnel who had arrived at the station.

The investigation identified that Metrorail did not follow its change management procedures required to ensure safe and effective emergency response. The Station Manager stated that locks were changed, but keys for these locks were not placed in the Knox Boxes used by first responders and were not provided to station managers as necessary to conduct effective safety checks or emergency response. The Rail Supervisor confirmed that no key to Room 121 was available in the Knox Box. Power personnel are the only Metrorail personnel with keys to power rooms.

¹ Metrorail restricts access to certain areas, including train control rooms and power rooms. Station managers have keys to only specific parts of the station. Metrorail has Knox Boxes that hold keys for fire department personnel access to certain areas. Certain areas require Metrorail escorts with expertise to ensure the safety of responders.



At 9:52 p.m., the ROCC directed train operators to enter and exit Ballston Station at 15 mph or less. Metrorail continued to service the station. This announcement was made on the Ops 4 radio channel used by personnel from Clarendon Station to points west.

At 10:02 p.m., MTPD stated riders in the station were being evacuated due to the toxic fumes and that trains should bypass the station. At 10:05 p.m., the Rail Supervisor reported that Arlington County Fire directed that trains bypass the station. At 10:08 p.m., MTPD and the Mission Assurance Coordinator (MAC) discussed the station closure and bypassing. At 10:11 p.m., the Ops 4 Radio Rail Traffic Controller announced on Ops 4 that trains should bypass Ballston Station without stopping.

Metrorail did not communicate via the designated Rail Supervisor and the ROCC operations desk regarding station ventilation fan activation. Instead, an MTPD individual communicated to the MAC at 10:12 p.m. that the fans should be activated. Fans were activated at 10:13 p.m. on supply and reconfigured to exhaust at 10:40 p.m.

At 10:13 p.m., an MTPD individual who stated they were at incident command told the MAC that no other trains should go through Ballston Station. The MAC acknowledged this radio communication. The Fire Liaison then stated that no more trains would service the station. At 10:15 p.m. and 10:20 p.m., fire department communications demonstrate the fire department's understanding that no trains would be travelling through the station, with shuttle buses running instead.

Riders in the station exited the station by 10:14 p.m.

At 10:19 p.m., the ROCC Radio Controller made a blanket announcement for train operators to turn off environmental ventilation systems at East Falls Church Station and turn them back on at Virginia Square-GMU Station. A similar announcement was not made for trains heading in the other direction, who were in Ops 4 territory until another blanket announcement at 10:35 p.m. Specific communications to individual trains occurred at 10:45 and 10:46 p.m. However, another train, Train 621, serviced Ballston-MU Station. Train 621 was in Ops 2, not Ops 4 territory at the time of the prior blanket announcement, leaving the Train Operators unaware of the instruction not to service Ballston-MU Station and to turn off environmental systems. Incident command personnel identified that the station was serviced, and ROCC confirmed with the Train Operator that they had serviced the station. A Rail Supervisor checked the station to ensure riders did not remain in the station. At 11:06 p.m., the Ops 2 Radio Rail Traffic Controller requested an available Rail Supervisor to report to Virginia Square-GMU and East Falls Church stations to instruct operators to bypass Ballston-MU Station. The Ops 4 Radio Rail Traffic Controller made a similar announcement a minute later. At 11:08 p.m., the Ops 2 Radio Rail Traffic Controller made a blanket announcement regarding the need to bypass Ballston-MU Station, turn off environmental systems, and to remind train operators to switch to Ops 4 radio at Clarendon Station. This change to utilize the Ops 4 radio channel from Clarendon Station to points west began in August 2021. Signage is present to remind operators.

The batteries in this room support the uninterruptible power supply (UPS) for the station's Train Control Room (TCR). The investigation demonstrated that the battery charger was not working properly, which led to excess energy being fed into the batteries. Metrorail had kept the UPS in service beyond the end of its useful life, allowing it to run to failure. Metrorail's Traction Power Maintenance Department determined that the output voltage was 181 volts direct current (DC) rather than the intended 131 volts DC. The batteries were overcharged at 3 volts per cell rather than 2 volts per cell. The batteries overheated. The Traction Power Maintenance Department determined based on system data that the toxic gas release began approximately 15 hours after the improper charging began, once the acid inside each battery began to boil. Gas went into other parts of the station. In addition, the ventilation unit in the room was not operating correctly. Had it been operating correctly, it would have more safely dispersed the fumes.



The room's exhaust fan did not function properly. According to the documentation from the previous preventive maintenance inspection, the fan was working at that time in August 2021. The exhaust fan for the room is separate from the room's ventilation system, which also did not work and did not keep the room cool as designed. In addition, Metrorail did not activate the separate tunnel ventilation fans in the station until 10:13 p.m., nearly an hour after the initial alarm.

At approximately 12:30 a.m. on August 12, 2022, Metrorail opened the battery disconnect to separate the batteries from the UPS. The battery bank later cooled down and stopped emitting the toxic gas. This power cut-off was delayed due to unclear labelling of cut-offs and insufficient training and communication of the actions power personnel must take during emergencies related to battery-supplied installations.

Elevators and other systems operated as specified for an emergency evacuation.

Probable Cause:

The probable cause of this event was Metrorail's ineffective maintenance and monitoring of equipment integral to safety such as battery chargers and exhaust fans. Contributing to the inadequate response to this event was Metrorail's insufficient safety promotion.

Corrective Actions:

As interim measures, Metrorail disabled power sources in the room, then installed a temporary charger with a generator to maintain power when needed while providing an opportunity to make repairs to the damaged systems.

Metrorail replaced smoke detectors in the room the day after this event.

Metrorail replaced the UPS at Ballston-MU Station, but it remains connected to temporary batteries. Metrorail ordered new batteries but did not have a date for delivery or installation.

Metrorail ordered a new exhaust fan and associated equipment, and repaired the ventilation fan system for the room.

Metrorail is developing a safety campaign for power personnel regarding battery safety and safety switch usage during response to emergency incidents.

Metrorail is developing a labeling system to identify key power cut-off switches in all stations.

Metrorail is developing a training guide for new power personnel on proper methods of power de-energization of battery-sourced locations in emergency situations.

WMSA staff observations:

Metrorail did not activate ventilation fans until 10:40 p.m. yet continued to send trains through the area with hazardous conditions.

Metrorail had the opportunity to identify and address the broken room ventilation system and room exhaust system prior to this event had it followed through on commitments made to the WMSA in spring 2022 to conduct special inspections of structural and environmental conditions in ancillary rooms in a timely fashion, or had personnel responsible for the room on a regular basis been properly trained to raise, report and escalate safety issues. The WMSA's order issued on August 4, 2022 demonstrated that Metrorail is not maintaining the integrity of ancillary rooms.



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The WMSC identified deficiencies in Metrorail's emergency response as part of prior investigations and in the Audit of Emergency Management and Fire and Life Safety Programs issued in February 2022. Metrorail is in the process of implementing corrective action plans (CAPs) to address the findings and recommendations of this audit, including that Metrorail does not consistently follow the incident command system structure.

Metrorail has repeatedly stated that the position it created in the ROCC of the MAC has an oversight role, however Metrorail continues to use the position as an active part of each event. Metrorail should ensure that there is appropriate communication among personnel in the ROCC so that personnel can carry out their roles in accordance with procedures.

Metrorail should ensure adequate training of personnel, including station familiarization and emergency procedures to ensure timely emergency response and access.

As part of WMATA's corrective actions to address the same deficiencies in radio communications for a September 7, 2021, Evacuation for Life Safety event at Pentagon Station, WMATA committed to address blanket announcements to personnel and trains operating on other radio channels as part of their Metrorail Safety Rules and Procedures Handbook (MSRPH) revision project by March 31, 2022. This event demonstrates that the same deficiencies still exist and must be mitigated.



Washington Metropolitan Area Transit Authority
Department of Safety (SAFE)
Office of Safety Investigations (OSI)

FINAL REPORT OF INVESTIGATION A&I E22513

Date of Event:	08/11/2022
Type of Event:	Evacuation for Life Safety Reason (Smoke/Fire)
Incident Time:	21:15 hours
Location:	Ballston-MU Station
Time and How received by SAFE:	21:17 hours – SAFE/MAC
WMSC Notification Time:	21:17 hours
Responding Safety Officers:	WMATA: None WMSC: None
Rail Vehicle:	None
Injuries:	None
Damage:	Battery Acid Leakage
Emergency Responders:	Arlington County Fire Department (ACFD), Metro Transit Police Department (MTPD), Office of Plant Maintenance (PLNT), Office of Traction Power Maintenance (TRPM),
SMS I/A Number	20220811#102344

Evacuation for Life Safety Reason, Ballston-MU Station

August 11, 2022

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Abbreviations and Acronyms

AIMS	Advanced Information Management System
ACFD	Alexandria City Fire Department
ARS	Audio Recording System
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
COMR	Office of Radio Communications
MSRPH	Metrorail Safety Rules and Procedures Handbook
MTPD	Metro Transit Police Department
NOAA	National Oceanic and Atmospheric Administration
PLNT	Office of Plant Maintenance
TCR	Train Control Room
TRPM	Office of Traction Power Maintenance
ROCC	Rail Operations Control Center
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
SAFE	Department of Safety
SMS	Safety Measurement System
SOP	Standard Operating Procedure
SRC	Safety Risk Coordinator
UPS	Uninterruptible Power Supply
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

On Thursday, August 11, 2022, at approximately 21:15 hours, the Arlington County Fire Department (ACFD) received a notification for an active fire alarm indication from Ballston-MU Station (K04) inside Battery Room 121 on the train platform level. At approximately 21:16 hours, the Mission Assurance Coordinator (MAC) notified the Maintenance Operations Center (MOC) of an active fire alarm at Ballston-MU Station. Data from systems of record and the Closed Circuit Television (CCTV) systems at Ballston-MU Station verified that all elevators and safety systems operated as designed for evacuation purposes.

At approximately 21:17 hours, the Rail Operations Information Center (ROIC) notified the Metro Transit Police Department (MTPD) of an active fire alarm at the Ballston-MU Station. MTPD dispatched units. At approximately 21:19 hours, the Radio Rail Traffic Controller (RTC) dispatched an Office of Rail Transportation (RTRA) Rail Supervisor to Ballston-MU Station for an active fire alarm. At approximately 21:20 hours, ACFD communications notified Rescue Engine 102 of an active fire alarm at Ballston-MU Station. At approximately 21:24 hours, ACFD dispatched additional units and updated the exact location of the fire alarm as Room 121 on the southeast portion of the platform.

At approximately 21:36 hours, MTPD Units arrived on the scene and established an Incident Command Post per Standard Operating Procedure (SOP) 1A. At approximately 22:02 hours, ACFD Rescue 1 notified Incident Command that the fire incident had been upgraded to a Hazmat condition. At approximately 22:04 hours, MTPD upgraded the alarm to a Hazmat condition in Room 121. ACFD reported to MTPD that overheated batteries located in Room 121 produced a high level of hydrogen cyanide fumes/gas in the station. ACFD and MTPD requested that all trains bypass the station and evacuate all customers. At approximately 22:11 hours, ACFD dispatched the Hazmat unit and additional resources to Ballston-MU Station. At approximately 22:12 hours, the Rail Operation Control Center (ROCC) established a bus bridge between East Falls Church and Virginia Square-GMU.

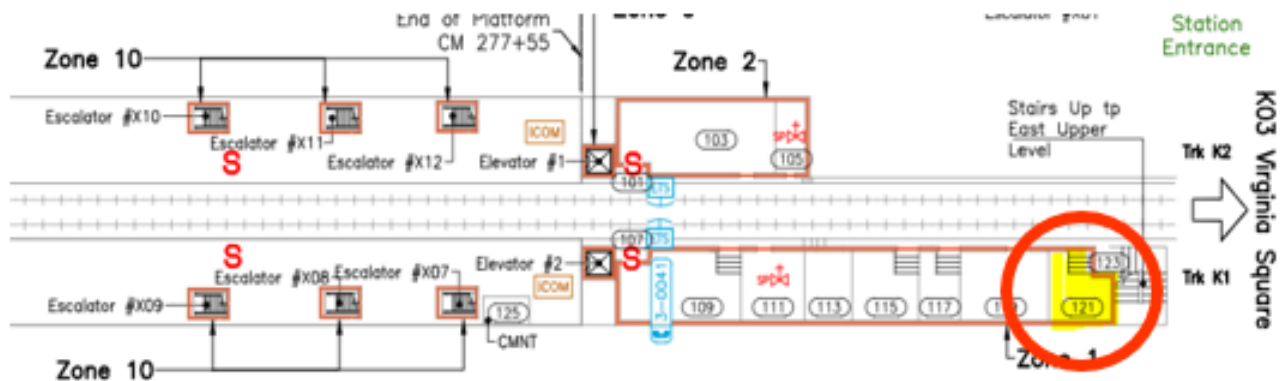
At approximately 22:12 hours, Incident Command requested that the tunnel fans in the station be activated to dispel the fumes and gases. At approximately 22:18 hours, ACFD reported that the Hazmat team arrived and reported that WMATA had evacuated and closed the station. Seven trains bypassed the station at a restricted speed without stopping. However, Train ID 621 stopped and serviced Ballston-MU Station at approximately 22:51 hours. At approximately 22:53 hours, Incident Command made another request for revenue trains not to service the station.

At approximately 23:02 hours, Incident Command confirmed that the fumes/gas levels returned to an acceptable level, and clean-up efforts could begin. At approximately 23:04 hours, the ACFD returned command control to MTPD; at approximately 23:24 hours, the Office of Traction Power Maintenance (TRPM) arrived and began clean-up efforts. At approximately 00:30 hours, MTPD turned the scene over to RTRA to continue the clean-up efforts.

The probable cause of the Evacuation for Life Safety Reasons (Smoke/Fire) event was a mechanical failure with the battery charger. This malfunction allowed excessive current to flow from the charging unit to the storage batteries, resulting in the release of hazardous fumes. A Contributing Factor to the event was the failure of the exhaust fan to disperse the fumes.

Incident Site

Ballston-MU Station (K04), Room 12 Field Sketch/Schematics



***Diagram not to scale*

Purpose and Scope

The purpose of this incident investigation and candid self-evaluation is to collect and analyze available data on the incident to determine the probable cause(s) of the incident, identify contributing factors, and make recommendations to prevent a recurrence.

Investigation Process and Methods

Upon receiving notification of the Evacuation for Life Reasons (Smoke/Fire) on August 11, 2022, SAFE dispatched a cross-functional team to assess the scene and conduct the investigation. SAFE team members worked with relevant WMATA subject matter experts to review the incident's facts and data.

Investigation Methods

The investigative methodologies included the following:

- Physical Site Assessment – A visual Station assessment was conducted. The Investigator did not conduct a full inspection of the affected room. The site was inspected by the WMATA Acting Fire Marshal and their assessment was referenced.
- Formal Interviews – SAFE interviewed three individuals as part of this investigation. The interview will include persons present at, during, and after the incident, those directly involved in the response process, and representatives from the Washington Metrorail Safety Commission (WMSC). SAFE will interview the following:
 - RTRA Station Manager
 - RTRA Supervisor
 - TRPM High Voltage Mechanic

- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information. Written statements were reviewed from personnel present during the event and present due to a shift change.
 - RTRA Station Manager
 - RTRA Supervisor
 - TRPM High Voltage Mechanic
- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include the following:
 - Metrorail Safety Rules and Procedures Handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA)
 - Rail Operations Control Center (ROCC) Incident Report
 - MTPD Incident Report
 - RTRA Supervisor Incident Report
 - WMATA Fire Marshal Report
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback
 - Open MHZ system
 - Advanced Information Management System (AIMS)
 - Closed Circuit Television (CCTV)

Investigation

On Thursday, August 11, 2022, at approximately 21:15 hours, the ACFD received an active fire alarm indication from 4230 Fairfax Drive in Arlington, VA, Ballston-MU Station (K04) inside Battery Room 121, located on the train platform level in Arlington County, Virginia. At approximately 21:16 hours, the MAC notified MOC of an active fire alarm at Ballston-MU Station. Data from the systems of record and the CCTV systems at Ballston-MU Station indicated that all elevators and safety systems operated as designed for evacuation purposes.

At approximately 21:17 hours, the ROIC notified the MTPD of an active fire alarm at the Ballston-MU Station; MTPD units were dispatched. At approximately 21:19 hours, the Radio RTC dispatched an RTRA Rail Supervisor to Ballston-MU Station for an active fire alarm. At approximately 21:20 hours, the ACFD communications notified Rescue Engine 102 of an active fire alarm at Ballston-MU Station. At approximately 21:24 hours, ACFD dispatched additional units and updated the exact location of the fire as Room 121 on the southeast portion of the platform.

From 21:29 to 21:48 hours, ACFD awaited the arrival of an RTRA Supervisor dispatched to Ballston Station via train from East Falls Church Station to gain access to Room 121 before forcing entry.

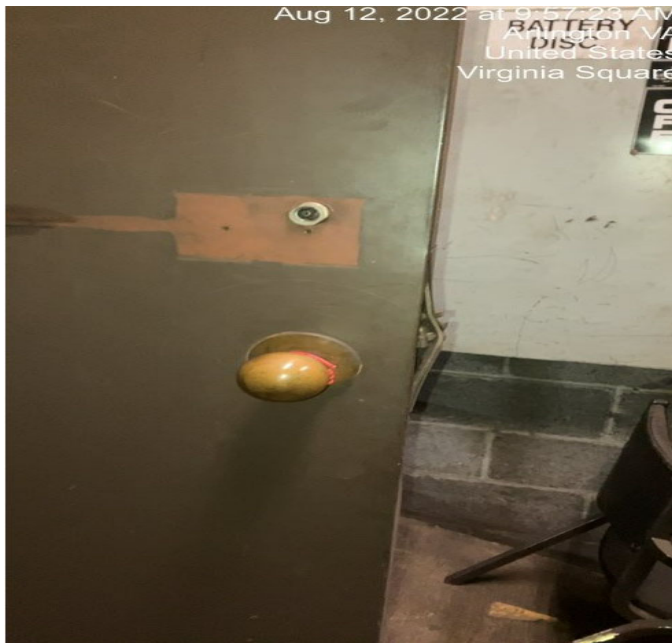


Figure 1 - ACFD breached Room 121 door.

CCTV confirmed an RTRA Supervisor boarded Train ID 601 Track #1 headed inbound in Ballston Station's direction at approximately 21:32 hours.



Figure 2 - RTRA Supervisor Boarded Train ID 601 at approximately 21:32 hours.

At approximately 21:36 hours, MTPD Units arrived on the scene and established an Incident Command Post per SOP 1A. The RTRA Supervisor arrived at Ballston Station at approximately 21:37 hours. At approximately 22:02 hours, ACFD Rescue 1 notified Incident Command that the fire incident had been upgraded to a Hazmat condition. At approximately 22:04 hours, MTPD upgraded the alarm to a Hazmat condition in Room 121. The request from MTPD was made at the request of the ACFD because of the toxic fumes that were present upon entry and testing by the ACFD. ACFD reported to MTPD that overheated batteries located in Room 121 produced a high level of hydrogen cyanide fumes/gas in the area of the battery room.



Figure 3 – Rechargeable Batteries in Room 121.

At approximately 22:04 hours, ACFD and MTPD requested that all trains bypass the station and to evacuate all customers. At approximately 22:11 hours, ACFD dispatched the Hazmat unit and additional resources to Ballston-MU Station. At approximately 22:12 hours, the ROCC established a bus bridge between East Falls Church and Virginia Square. Incident Command requested the tunnel fans in the station be activated to dispel the fumes and gases. At approximately 22:13 hours, the AIMS event log data confirmed fan activation.

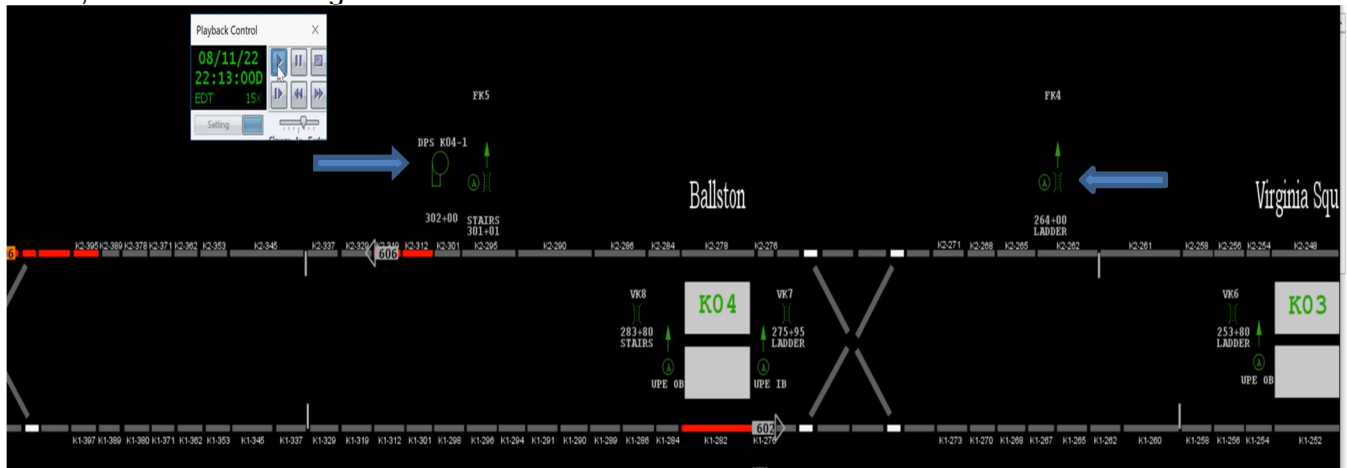


Figure 4 AIMS Ballston Station Fan activation

At approximately 22:18 hours, ACFD reported that the Hazmat team had arrived and reported that WMATA had shut down the station for revenue service.

A review of CCTV and AIMS Playback determined that between 22:13 hours – 22:51 hours, Orange Line Train IDs 904, 901, 905, 902, and Silver Line Train IDs 607, 604, and 622 bypassed Ballston-MU Station. However, CCTV and AIMS playback confirmed Train ID 621 serviced Ballston-MU Station at approximately 22:51 hours.



Figure 5 - CCTV showed Train ID 621 serviced Ballston Station platform at 22:51 hours.

At approximately 22:53 hours, Incident Command made a second request for revenue trains to stop servicing the station. At approximately 23:02 hours, Incident Command confirmed that the fumes/gas levels returned to an acceptable level, and clean-up efforts could begin. At approximately 23:04 hours, the ACFD returned command control to MTPD. At approximately 23:24 hours, TRPM arrived and began clean-up efforts.

At approximately 00:30 hours, MTPD returned the scene to RTRA supervision to continue the clean-up efforts.

A post-event investigation by TRPM determined that the battery charger malfunctioned, which allowed an overage of voltage to flow from the charging unit to the storage batteries. Further discoveries during this investigation revealed that the ventilation fan unit in battery Room 121 was not operating correctly at the time of the event, which would have dispelled the fumes within the room. Their fault analysis is expanded on later in this section.



Figure 6 - Room 121 Ventilation Fan Ballston Station.

The Fire Marshal's report indicated that on August 11, 2022, at approximately 21:15 hours, the ROCC and Station Manager received an automatic fire alarm for smoke in Room 121 at K04 (Ballston). ACFD responded and found a light haze of smoke. The light haze was identified as hydrogen sulfide gas emanating from an overheated battery system.

The station was evacuated, and the ACFD requested their Hazmat Unit to respond. The ACFD Hazmat Unit reported that the incident was confined to one room. The Hazmat unit requested that trains continue through the station to dispel the smoke.

On August 12, 2022, the Fire Marshal conducted an on-site review of the event site. They also reported that the battery charger malfunctioned and allowed too much amperage to flow from the charging unit to the storage battery. The room's ventilation was not functioning at the time of the incident. The battery charger malfunction caused the batteries to overheat and boil. These batteries support the UPS for the Train Control Room (TCR). To mitigate the condition and prevent a recurrence, TRPM installed a temporary charger with a generator until repairs can be made.

On August 22, 2022, TRPM concluded after investigating this incident that the UPS had an internal fault causing the DC output voltage to be 181 VDC instead of 131 VDC. The DC output feeds the battery bank and the AC room DC panel. Since the battery bank was overcharged at 3 volts per cell instead of 2 volts per cell, it caused the bank to overheat. The battery bank entered into the overload condition approximately 15 hours after the failure.

The overheating caused the acid inside each cell to boil and produce the gas. The battery room exhaust fan exhausted the gas into the station. TRPM personnel verified a 181 VDC output with a multimeter.

The UPS event history shows that the internal fault started on 8/10/2022 at approximately 0300 hours. On site, the battery disconnect was opened, disconnecting the battery bank from the UPS. This allowed the bank to cool down and stop gassing.



Figure 7 - Temporary Charger installed for mitigation purposes (photo taken prior to installation).

A temporary charger with a generator was installed for mitigation purposes until permanent repairs could be made. Additionally, a new exhaust fan and associated equipment were ordered and will be replaced by the Office of Plant Maintenance (PLNT). On August 26, 2022, PLNT completed and tested the repairs on the ventilation fan system in room 121, which is fully operational.

The UPS unit at Ballston station has been replaced as of October 3, 2022. The new UPS is connected to temporary batteries. The new batteries are on order, but a delivery date was not available. Currently, there is no timeframe for their installation.

Chronological ARS Timeline

A review of ARS playback, i.e., phone and radio communications, revealed the following timeline:

Time	Description
21:15:37 hours	<u>AIMS event log</u> : Confirmed Active Alarm.
21:15:39 hours	<u>Ballston Station CCTV</u> : Verified elevators acted as designed, moved upward to the street level, and opened doors.
21:15:55 hours	<u>MOC ATC/COMM</u> : Notified of an active fire alarm at Ballston-MU Station [Phone]
21:17:34 hours	<u>ROIC</u> : Notified MTPD of active fire alarm.
21:18:03 hours	<u>Radio RTC</u> : Contacted RTRA Supervisor for an active fire alarm at Ballston-MU station. [Radio Ops4]

Time	Description
21:18:39 hours	<u>OPS4:</u> Contacted regarding an active fire alarm at Ballston Train Station. [Phone]
21:20:43 hours	<u>ACFD Communications:</u> Dispatched emergency responders to Ballston Station for an active fire alarm [ACFD Open Mhz]
21:22:54 hours	<u>ACFD Communications:</u> Dispatched additional emergency responders to Ballston Station for a smoke alarm. [Open Mhz]
21:23:26 hours	<u>MTPD Dispatcher:</u> Dispatched MTPD Unit to Ballston Station MU for active fire alarm. [Radio]
21:24:09 hours	<u>ACFD Communications:</u> Notified emergency responders that the alarm was located in room 121, southeast platform. [Open Mhz]
21:24:49 hours	<u>ACFD Rescue Engine 102:</u> Notified the ROCC Liaison that they arrived on the scene and noted the report room was 121 Equipment Room. [ACFD OPEN Mhz]
21:29:08 hours	<u>ACFD Personnel:</u> Notified Rescue 102 that they were positioned at the Kiosk. [ACFD Open Mhz]
21:29:19 hours	<u>OPS4:</u> Notified the ROIC of an active fire alarm at Ballston Train station. Updates that the RTRA supervisor en route and the location of the fire.
21:29:36 hours	<u>ACFD Rescue 102:</u> Instructed arriving ACFD personnel to stand by Rescue 102 and noted their location on the lower-level track#1. The room was just beyond the platform, waiting for access. [ACFD Open Mhz]
21:30:32 hours	<u>ROIC:</u> RTRA Supervisor contacted ROIC to note they were waiting on a train to arrive for transport to Ballston-MU. [Phone]
21:32:11 hours	<u>ROCC Liaison:</u> <i>Beginning of the transmission cutout.</i> "East Falls Church station to Ballston, and they will be able to escort you beyond the gate to check that room. [ACFD Open Mhz]
21:32:33 hours	<i>CCTV showed an RTRA Supervisor boarded Train ID 601 toward Ballston Station</i>
21:32:40 hours	<i>AIMS playback showed Train ID 601 headed towards Ballston Station from East Falls Church Station.</i>
21:36:49 hours	<u>MTPD Unit:</u> Arrived on the scene, and advised ACFD also on the scene. [Radio]
21:48:36 hours	<u>Station Manager Mezz 99:</u> Contacted MOC PLNT that battery room 121 will need a new lock. ACFD breached the door. [Phone]
21:51:14 hours	<u>RTRA Supervisor:</u> Asked for restrictive speeds for all trains entering and exiting Ballston Train Station. [Phone]
21:51:38 hours	<u>OPS4:</u> Instructed RTC to announce all operators on tracks one and two of restrictive speeds of 15 mph or less when entering and exiting Ballston. [Phone]
21:52:02 hours	<u>Radio RTC:</u> Made system announcement for all trains to operate restricted speed not to exceed 15 mph entrance and exit due to personnel beyond the end gate. [Radio OPS 4]
22:01:09 hours	<u>MOC LEAD:</u> Called ROCC RTC to inquire if TRPM was on the scene. <u>RTC Radio:</u> Contacted RTRA supervisor and verified that TRPM was on the scene.

Time	Description
22:01:31 hours	<u>ROCC Liaison</u> : Communicated with Engine 102 and reported no ETA for personnel arrival to assist with access; they did not have any information. ROCC Liaison stated, "it is at your discretion." [ACFD OpenMhz]
22:02:21 hours	<u>Rescue 102</u> : Notified ACFD to upgrade incident to hazmat [ACFD OpenMhz]
22:02:37 hours	<u>MTPD Unit</u> : Upgraded active alarm to a Hazmat condition in room 121. A battery source creating toxic fumes. Evacuating all customers, have all trains bypass the station. [Radio]
22:03:39 hours	<u>RTC Radio</u> : Called MOC LEAD acknowledges that PLNT Power is present. [phone]
22:04:01 hours	<u>Rescue 102</u> : Reported a battery malfunction with high levels of hydrogen cyanide and <i>[distorted]</i> [ACFD OpenMhz]
22:04:51 hours	<i>ROCC Fire Liaison Officer, Rescue 102, and ACFD communications discussed that the Talk group switched to one Charlie. Rescue 102 reported they would upgrade to hazmat if the responding team did not have a good ETA. [ACFD OpenMhz]</i>
22:05:52 hours	<u>Rescue 102</u> : Requested dry chemical extinguisher. [ACFD OpenMhz]
22:05:59 hours	<u>RTRA Road Supervisor</u> : Contacted Radio RTC; ACFD requested that trains bypass Ballston-MU station. [Radio Ops 4]
22:06:27 hours	<u>Battalion Chief 111</u> : Notified that Command was established at Fairfax drive. [ACFD OpenMhz]
22:07:10 hours	<u>AOM</u> : Notified Station Manager ACFD wanted trains to bypass Ballston Station. Have 906 to hold the platform. The Fire Department request that trains bypass Ballston.
22:07:11 hours	<u>MOC</u> : Received call that batteries overheated and exploded, which caused fire alarm. [Phone]
22:07:53 hours	<u>ROCC</u> : Notified ROIC of the last trains that will enter-leave Ballston [Phone]
22:08:08 hours	<u>RTRA Supervisor</u> : Confirmed no other trains to service the station.
22:08:40 hours	<u>MTPD Supervisor Unit</u> : On scene, have all trains bypass the station and closed to customers. [Radio]
22:09:11 hours	<u>MTPD Supervisor Unit</u> : Switch to Tac channel MTPD2x. <u>MAC</u> : Acknowledged and Repeated. Bypass station and closure to Patrons. [Radio]
22:09:40 hours	<u>Battalion Chief 111</u> : Notified communications of a hazmat investigation and provided all responders on the premises. [ACFD OpenMhz]
22:09:53 hours	<u>ACFD dispatcher</u> : Dispatched ACFD hazmat unit and additional resources to Ballston Station. [ACFD OpenMhz]
22:10:12 hours	<u>MTPD UNIT</u> : Requested Metro Bus Supervisor and Bus Bridge. [Radio]
22:10:51 hours	<u>Radio RTC</u> : Called the ROIC instructing that trains bypass Ballston. [Phone]

Time	Description
22:11:25 hours	<u>ACFD Dispatcher</u> : Dispatched ACFD hazmat unit and additional resources to Ballston Station. [ACFD OpenMhz] <u>MTPD Supervisor#2</u> , MTPD unit on scene. [Radio]
22:11:38 hours	<u>Radio RTC</u> : Made announcements for all trains to bypass Ballston and not service the station.
22:12:13 hours	<u>Ops 4 Controller</u> : Established bus bridge between East Falls Church and Virginia Square-GMU. [Phone Ops 4]
22:12:30 hours	<u>AOM</u> : Reported to the Station Manager why ACFD wanted trains to bypass the station. <i>ACFD reported a strong smell coming from the room</i> [Phone]
22:12:40 hours	<u>Ballston Command</u> : Requested Tunnel Fan activation. <u>MAC</u> : Acknowledge and Repeat.
22:13:00 hours	<u>AIMS Playback</u> : Confirmed Train ID 602 was the last train to service Ballston Station, Track 1. Train ID 606 was the first train to bypass Ballston Station on Track #2.
22:13:13 hours	<u>Ballston Command</u> : Requested no other trains through Ballston-MU Station. <i>2nd Request</i> <u>MAC</u> : Acknowledge and Repeat. [Radio]
22:13:23 hours	<u>ROCC Liaison</u> : Notified command that no more trains will service the station. MTPD is evacuating the remaining customers. [ACFD Open Mhz]
22:13:44 hours	<u>OPS4 Radio</u> : Announced to bypass Ballston, do not service the station. Customers can take the 28 bus to Ballston.
22:13:51 hours	<u>AIMS Event Log</u> : Showed Fans Activated
22:14:00 hours	<u>Ballston CCTV</u> : The last customers exit the station.
22:14:33 hours	<u>OPS4 Radio</u> : Asked the RTRA supervisor if the station is all clear of customers, gives Bus Bridge information.
22:15:29 hours	<u>OPS4 Radio</u> : Called MTPD to notify them of the situation.
22:15:42 hours	<u>Rescue 102</u> : Reported to command that the last train came through; they completely shut the station down and will just be providing buses. [ACFD OpenMhz]
22:16:07 hours	<u>MTPD</u> : UUnits22 and 66 are on scene.
22:18:03 hours	The hazmat team arrived at Ballston station. [ACFD OpenMhz]
22:19:02 hours	<u>MTPD Supervisor#1</u> : announced role of on-scene commander. [Radio]
22:19:12 hours	<u>OPS4 Radio</u> : announcement made to bypass Ballston and turn off EVs [Radio]
22:19:25 hours	<u>OPS4 Radio</u> : Turn off EVs at East Falls Church and turn them back on at Virginia Square. [Radio]
22:19:54 hours	<u>RTRA Road Supervisor</u> : RTRA supervisor discussed train ventilation with ROCC. [Phone]
22:20:52 hours	<u>Rescue 102</u> : Reported Station shutdown by WMATA [ACFD Open Mhz]
22:25:10 hours	<u>MTPD Unit</u> : Requested all unnecessary personnel to exit the station. [Radio]
22:26:44 hours	<u>MTPD</u> : Unit 64 on scene.

Time	Description
22:26:55 hours	<u>RTRA Supervisor</u> : updated on the arrival of the ACFD Hazmat team, and FD requests all unnecessary personnel out of the station.
22:27:35 hours	<u>MOC</u> : Contacted ROCC and gave information that ACFD wants the station evacuated. [Phone]
22:29:22 hours	<u>OPS4 Radio</u> : Instruct Train#607 to bypass Ballston due to a fire condition and advises Bus 28 for service back to Ballston.
22:30:04 hours	<u>ROIC</u> : Contacted ROCC to confirm that ACFD wanted the station evacuated. [Phone]
22:31:20 hours	<u>OPS4 Radio</u> : Calls Ballston Station Manager to change radio channel to OPS5.
22:33:23 hours	<u>Ballston Command</u> : Made a second request for bus supervisor. <u>MAC</u> : Acknowledged and repeated. "Still working on that." [Radio]
23:35:05 hours	<u>MAC</u> : Updated Ballston Command with the responding bus supervisors' information. [Radio]
22:35:36 hours	<u>OPS4 Radio</u> : Announcement made to bypass Ballston and turn off EVs. [Radio]
22:40:20 hours	<u>AIMS Playback</u> : Showed Ballston Station Fans activated on supply, then changed to exhaust.
22:45:33 hours	<u>OPS4 Radio</u> : 622, Track#1, service East Falls Church and then bypass Ballston and cut EVs
22:46:09 hours	<u>OPS4 Radio</u> : Train 902, after servicing Virginia Square cut EVs and bypass Ballston. [Radio]
22:51:20 hours	<u>Radio RTC</u> : Bus Bridge established [Radio]
22:53:54 hours	<u>Ballston Command</u> : Notified the MAC that trains are still arriving at the station and letting passengers off in the station. [Radio]
22:56:36 hours	<u>OPS4 Radio</u> : Transmitted to 621, if he serviced Ballston. <u>Train 621</u> : Acknowledged, yes one customer. <u>OPS4 Radio</u> : Requested RTRA Supervisor to verify. <u>RTRA Supervisor</u> : Negative, not allowed in the station at this time. <u>OPS4 Radio</u> : We have one customer that serviced Ballston, need verification.
22:57:17 hours	<u>OPS4 Radio</u> : RTRA Supervisor can you inspect the station and make sure no customers are there? Train 621 serviced the station. [Radio]
22:59:46 hours	<u>OPS4 Radio</u> : announcement made to bypass Ballston and turn off EV's. [Radio]
22:59:52 hours	<u>RTRA Supervisor</u> : Confirmed Track one and two are clear of customers.
23:02:31 hours	<u>Ballston Command</u> : Notified ACFD communications that they are turning the scene over to MTPD, ERT, and RTRA Supervisor. Power isolated from batteries and gases ventilated from the room. [ACFD OpenMhz]
23:04:33 hours	<u>Ballston Command</u> : Smoke and gas are at an acceptable level. ACFD will be clearing, and the command will be returned to MTPD. [Radio]
23:05:03 hours	<u>OPS4 Radio</u> : announcement made to bypass Ballston and turn off EVs [Radio]

Time	Description
23:05:35 hours	<u>OPS4 Radio</u> : Updated the Bus Bridge [Radio]
23:06:09 hours	<u>OPS2 Radio</u> : Request made to available RTRA supervisor to respond to Virginia Square and East Falls Church to instruct operators to bypass Ballston Train Station. [Radio]
23:07:21 hours	<u>OPS4 Radio</u> : Instructed RTRA Supervisor to report to Virginia Square and instruct operators to turn off EVs and bypass Ballston Train station.
23:08:25 hours	<u>OPS2 Radio</u> : announcement made to bypass Ballston and turn off EVs; when you leave Clarendon – switch to OPS4.
23:09:53 hours	<u>OPS2 Radio</u> : Contacted RTRA supervisor to respond to East Falls Church Train station and instruct the operators to pass Ballston Train Station. [Radio]
23:10:37 hours	<u>Ballston Command</u> : Power Supervisor on scene.
23:12:01 hours	<u>OPS2 Radio</u> : announcement made to bypass Ballston and turn off EV's. [Radio]
23:13:10 hours	<u>OPS2 Radio</u> : announcement made to bypass Ballston and turn off EV's. [Radio]
23:11:22 hours	<u>OPS4 Radio</u> : Calls OPS2 and requested additional notifications to bypass Ballston Train Station and shut off their EVs
23:14:15 hours	<u>RTRA Supervisor</u> : Stated that gas levels are at acceptable levels. A generator will be utilized at K06 to power the battery room. [Radio]
23:18:00 hours	<u>OPS4 Radio</u> : Contacted West Falls Church management to discuss Train 621 and the requests a supplemental incident report.
23:20:14 hours	<u>OPS4 Radio</u> : announcement made to bypass Ballston and turn off EVs [Radio]
23:23:13 hours	<u>RTRA Supervisor</u> : Updated; ACFD requested that the station be closed until tomorrow but still need trains to pass through Ballston to dispel the gas. [Radio]
23:23:35 hours	<u>RTC Radio</u> : Made notification of ACFD requesting to close the station until tomorrow morning due to safety concerns.
23:24:49 hours	<u>Ballston Command</u> : Battery Supervisor on scene. [Radio]
23:25:48 hours	<u>OPS2 Radio</u> : announcement made to bypass Ballston and turn off EV's [Radio]
23:31:08 hours	<u>OPS2 Radio</u> : announcement made to bypass Ballston and turn off EV's <u>RTRA Supervisor</u> : Virginia Square. [Radio]
23:38:04 hours	<u>Ballston Command</u> : MTPD requested incident report numbers. [Radio]
23:43:32 hours	<u>OPS2 Radio</u> : announcement made to bypass Ballston and turn off EV's [Radio]
00:30:15 hours	<u>Ballston Command</u> : MTPD returns scene over to RTRA supervision. [Radio]
00:35:38 hours	<u>MTPD Supervisor</u> : Cleared MTPD TAC2X. [Radio]

****Note:** Times above may vary from other systems' timelines based on clock settings and reporting sources.

Fire Marshal Final Report

The Fire Marshal's report indicated that on August 11, 2022, at approximately 21:15 hours, the ROCC and Station Manager received an automatic fire alarm for smoke in room 121 at K04 (Ballston). ACFD responded and found a light haze of smoke. The light haze was identified as hydrogen sulfide gas emanating from an overheated battery system.

The station was evacuated, and the ACFD requested their Hazmat Unit to respond. The ACFD Hazmat Unit reported that the incident was confined to one room. The Hazmat unit requested that trains continue through the station to dispel the smoke.

On August 12, 2022, they conducted an on-site review of the event site. They reported that the battery charger malfunctioned and allowed too much amperage to flow from the charging unit to the storage battery. The room's ventilation system was not functioning at the time of the incident, and Preventive Maintenance Inspection (PMI) reports have been requested. The battery charger and the ventilation system caused the batteries to overheat and boil. These batteries support the UPS for the TCR.

To mitigate the condition and prevent recurrence, a temporary charger with a generator was installed until repairs were made.

Formal Statement Summary

As part of the investigation launched into the Evacuation for Life Safety Reasons (Fire/Smoke) event, SAFE reviewed written statements with the following key findings associated with this event. The detailed findings include reported information from written statements that may conflict with other data sources in this report.

Station Manager Ballston-MU Station (Formal Statement)

- The Station Manager stated that at approximately 21:30 hours, they received a notification from the F&I panel and a telephone notification from the ROIC of an active fire alarm and asked to investigate the matter.
- The Station Manager reported that they immediately went to investigate and could not locate the fire/smoke source in the station. The Station Manager did not have key access to multiple locations in the station.
- The Station Manager stated that the fire department breached the door of room 121 to gain entry and located the source to be a leaking battery that was emanating fumes.
- The Station Manager stated that after the discovery by the Fire Department, the station was deemed a hazard. The station was evacuated and closed for the evening for revenue service.
- The Station Manager stated that she enacted the procedures for Station evacuations of all customers and employees present to ensure their safety.
- The Station Manager stated that this event reported no injuries from customers or employees.
- The Station Manager stated that the locks on numerous doors could have been changed recently, and the updated copies have not been supplied to the Knox Box.
- The Station manager requested that an updated copy of the key be provided to them and the Knox Box to streamline access during emergencies and allow the Station managers to perform periodic safety checks.

RTRA Rail Supervisor (Formal Statement)

- The RTRA Supervisor stated that they were notified of an active fire alarm at Ballston-MU Station by ROCC at approximately 21:30 hours.
- The RTRA Supervisor said they arrived at Ballston-MU Station at approximately 21:40 hours and assisted the ACFD, who was waiting for him to escort them past the end gate.
- The RTRA Supervisor stated that they escorted FD personnel to Room 121, where the source of the fire/smoke originated.
- The RTRA Supervisor stated that the door to room 121 was breached by the ACFD because there was no key to room 121 in the Knox box.
- The RTRA Supervisor stated that he was informed that the PLNT power department is the only WMATA personnel issued keys to the power supply rooms.
- The RTRA Supervisor stated that with assistance from a PLNT technician and ACFD, they could get the room cooled enough to disable the power source to the room, which helped dispel the smoke.
- The RTRA Supervisor stated that the ACFD Department departed the scene at approximately 23:20 hours. ACFD turned the incident scene was turned over to RTRA at 00:30 hours.
- The RTRA Supervisor recommended better communication in the ROCC/RTC to relay accurate messages to both OPS2 and OPS4 during emergencies to ensure the tactical messages are heard on both channels.

PLANT Electrical Mechanic B: (Formal Statement)

- The Plant Electrical Mechanic B stated that the PLNT Power Desk notified them of an active fire alarm and instructed them to respond to Ballston-MU Station at approximately 21:35 hours.
- The PLNT Mechanic stated that when they arrived, ACFD met them in room 121. The PLNT Mechanic stated that upon entering the room, they smelled a large amount of smoke emanating from the room, making it impossible to breathe.
- The PLNT Mechanic stated that he visually inspected the UPS device, which indicated that the amperage reading was 181 volts, which made the batteries hot.
- The PLNT Mechanic stated that it was not safe to enter the room with proper PPE's and notified the Supervisor from the Fire Department.
- The PLNT Mechanic stated the ACFD Hazmat Team arrived and disconnected the power switch inside the room to disallow amperage to feed into the batteries.
- The PLNT mechanic stated that after the ACFD cleared the location, themselves and the PLNT Battery Supervisor inspected the voltage reading on the UPS device and Breaker Switch, which all read 181 volts.
- The PLNT Mechanic stated that they disconnected the battery's power source and temporarily connected the generator to power the station.

Weather

On August 11, 2022, at the time of the incident, NOAA recorded the temperature as 77° F and Clear skies. The event occurred within a tunneled section of the rail system. Weather was not a contributing factor in this event (Weather source: NOAA – Location: Arlington, VA).

Human Factors:

Fatigue

The biomathematical fatigue modeling application (SAFTE-FAST Web SFC) was not applied for this event.

Post-Incident Toxicology Testing

This incident did not meet the criteria for WMATA's Drug and Alcohol Policy and Testing Program 7.7.3/6.

Office of System Maintenance, Office of Radio Communications (COMR)

SAFE Office of Safety Investigations (OSI) requested COMR personnel to perform radio checks of the affected area and COMR personnel concluded no defects or issues were found with radio communications near Ballston-MU-Train Station.

Findings

- UPS had an internal fault causing the DC output voltage to be 181 VDC instead of 131 VDC. The DC output feeds the battery bank and AC room DC panel. UPS event history showed an internal fault started on 8/10/2022 at approximately 03:00 hours.
- The UPS's malfunction led an overcharging of the batteries.
- The battery room ventilation fan system was inoperable at the time of the incident.
- Door key was unavailable for ACFD to gain entry to Room 121, resulting in the door being breached by ACFD.
- ROCC activated the Tunnel Fans to assist with expelling fumes due to an inoperable fan in the battery room.
- Between 22:13 hours – 22:51 hours, Orange Line Trains ID 904, 901, 905, 902, and Silver Line Train ID 607, 604, and 622 bypassed Ballston Station before Train ID 621 serviced Ballston Station Track 1.
- CCTV and AIMS playback confirmed Train ID 621 serviced Ballston Station at approximately 22:51 hours.

Immediate Mitigation to Prevent Recurrence

- TRPM and PLNT personnel were dispatched to assist in the mitigation of the condition and clean-up of the spill.
- All power sources were disabled in Room 121.
- Hazardous Material personnel cleared the area prior to recovery efforts.
- A temporary charger equipped with a generator, was installed until permanent repairs could be made.

- On August 26, 2022, PLNT completed and tested the repairs on the ventilation fan system in room 121 and is fully operational.
- Smoke Detectors in the room were replaced on August 12, 2022.

Probable Cause Statement

The probable cause of the Evacuation for Life Safety Reasons (Smoke/Fire) event was a mechanical failure with the battery charger. This malfunction allowed excessive current to flow from the charging unit to the storage batteries, resulting in the release of hazardous fumes. A Contributing Factor to the event was the failure of the exhaust fan to disperse the fumes.

Recommendations/Corrective Actions

The following are the recommendations and corrective actions identified as a result of the incident response. These recommendations and corrective actions are tracked using WMATA's Safety Measurement System Incidents/Accidents (SMS I/A) Module and are verified by SAFE upon completion. The responsible department is identified in the corrective action code, and the respective departmental Safety Risk Coordinator (SRC) will manage the mitigation. Refer to the SMS I/A module for additional information

Corrective Action Code	Description	Responsible Party	Estimated Completion Date
102344_SAFE CAPS_RTRA	Develop a lesson learned document to outline/train procedures to notify supervisors and Operators of possible delays, closures, and Police/Fire activities across OPS channels lines during emergencies.	RTRA	01/15/2023
102344_SAFE CAPS_TRPM	Develop a Safety Campaign with TRPM for battery safety/safety switch usage during the response to emergency incidents. Develop a labeling system to identify key power cut-off switches in all stations.	TRPM	Completed
102344_SAFE CAPS_TRPM	Develop a lesson learned training guide for all new TRPM personnel on the proper methods of power de-energizations of battery-sourced locations in emergency situations.	TRPM	Completed

Appendices

Appendix A – Interview Summary

The narrative below summarizes the employee's accounts of the event and represents the involved individual's written statements. As such, times and details may conflict with the data contained in systems of record.

Station Manager Ballston-MU Station:

During the formal interview with the Station manager, they stated that at approximately 21:30 hours, they received a notification from the F&I panel and a telephone notification from the ROIC of an active fire alarm and were asked to investigate the matter. The Station Manager reported that they immediately went to investigate but could not locate the fire/smoke source in the station because they did not have key access to multiple locations in the station. The Station Manager stated that the fire department arrived quickly, breached the door of room 121 to gain entry, and located the source to be a leaking battery that was emanating fumes. The Station Manager stated that after the discovery by the Fire Department, the station was deemed a hazard.

The Station Manager was instructed to evacuate and closed for the evening for revenue service. The Station Manager stated that she enacted the procedures for Station evacuations of all customers and employees present to ensure their safety. The Station Manager noted that this event reported no injuries from customers or employees. The Station Manager stated that the locks on numerous doors could have been changed recently, and the updated copies have not been supplied to the Knox Box. The Station manager requested that an updated copy of the key be provided to them and the Knox Box to streamline access during emergencies and allow the Station managers to perform periodical safety checks.

RTRA Rail Supervisor:

During the formal interview with the RTRA Rail Supervisor stated that he was notified of an active fire alarm at Ballston-MU Station by the ROCC at approximately 21:30 hours. The RTRA supervisor said he arrived at Ballston Station at approximately 21:40 hours and assisted the ACFD. The RTRA Supervisor stated that he escorted FD personnel to room 121, where the source of the fire/smoke originated from. The RTRA Supervisor stated that the door to room 121 was breached by the ACFD because there was no key to room 121 in the Knox box.

The RTRA Supervisor said that with assistance from a PLNT Power unit and ACFD, they could get the room cooled enough to disable the power source to the room, which would help dispel the smoke. The RTRA Supervisor stated that the ACFD department departed the scene at approximately 23:20 hours, and the incident scene was turned over to RTRA at 00:30 hours. The RTRA Supervisor made a recommendation for better communication in the ROCC/RTC to relay accurate messages to both OPS2 and OPS4 tac channels during emergencies to ensure that all tactical messages are heard on both channels for incoming and outgoing trains.

PLANT Electrical Mechanic B:

During the formal interview with the Plant Electrical, Mechanic B stated that he was notified of an active fire alarm by the PLNT Power Desk and was asked to respond to Ballston-MU Station at approximately 21:35 hours. The PLNT Mechanic stated that when he arrived, he was met by the Fire Department by room 121. The PLNT Mechanic stated that upon entry into the room, he

observed and smelled a large amount of smoke emanating from the room, which made it impossible to breathe. The PLNT Mechanic stated that he visually inspected the UPS device, which indicated that the amperage reading was 181 volts, which made the batteries hot. The PLNT Mechanic stated that it was not safe to enter the room with proper PPE's and notified the Supervisor from the Fire Department. The PLNT Mechanic stated the ACFD Hazmat Team arrived and disconnected the power switch inside the room to disallow amperage to feed into the batteries. The PLNT mechanic stated that after the ACFD cleared the location, they and the PLNT Battery Supervisor inspected the voltage reading on the UPS device and Breaker Switch, which all read 181 volts. The PLNT Mechanic stated that they disconnected the battery's power source and temporarily connected the generator to power the station.

Appendix B – Battery Data Sheets

Date: 8/12/21
#16581178

BATTERY DATA SHEET 2 of 2				
Location: <u>KOYACI</u>		Date: <u>8/18/21</u>	Last Inspected: <u>8/18/21</u> <u>15:00</u>	
Battery Manufacturer: <u>Liquid</u>		Cell Type: <u>Wet</u>	# of Cells: <u>60</u>	
AC Room:		DC Room:	Room Temperature: <u>75</u> °F	
Record status and condition of batteries. Place an X in the YES box if operational with no defects. Record defects and FSR# in REMARKS box.				
CHECKPOINTS		YES	NO	REMARKS
Check Plates For:	1. Bending	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	2. Discoloration of Positives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	3. Discoloration of Negatives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Bottom of Cells for Excess Sediment		<input type="checkbox"/>	<input type="checkbox"/>	
Check Cells For Cleanliness:	1. Dust/Dirt	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	2. Acid Spills	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Condition of Jars For:	1. Cracks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	2. Leaks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	3. Signs of Deterioration	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Condition of Battery Rack For:	1. Corrosion	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	2. Stability	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Liquid Levels. Note Cells and Amount Added		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Inter-Cell Connections, Battery Terminals For:	1. Corrosion/Acid Build-up	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	2. Grease	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check that the Fan is Ventilating Room and operating Correctly		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Tightness of Jumpers & Leads		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Condition of Flame Arrestors and Duct Caps		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Check Condition of Floor Mats		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Record Pilot Cell Temperature		<u>86</u>	°F	<u>75</u>
Lead-Calcium (Rectangular) Cells Only: Record Pilot Cell's Corrected Specific Gravity. (For every 3° above 77 °F add 0.001. For every 3° below 77 °F subtract 0.001.)				
Record Specific Gravity Temperature Correction Factor for Lead-Calcium (Rectangular) Battery.				
Battery Charger Data				
Float Volts: <u>13.1</u> DC	Equalize Volts: <u>13.1</u> DC	Timer Setting: _____ Hrs.		
Float Amps: <u>5</u> DC	Equalize Amps: <u>5</u> DC	Circle Mode: Auto/ Float/Equalize		
Ground Detection: + to Ground <u>13.1</u> VDC		Ground Detection: - to Ground <u>11.8</u> VDC		
Remarks: <u>Jumpers 1-2, 31-32</u>				

Figure 7 Battery Test Pg-1

Aug

WD: 15079493 BATTERY DATA SHEET 2 of 2

Location: KO-1 AC1 Date: 11 Aug 19 Last Inspected:

Battery Manufacturer: Lisco Cell Type: Round Cell # of Cells: 60

AC Room: DC Room: 121 Room Temperature: 75 °F

Record status and condition of batteries. Place an X in the YES box if operational with no defects. Record defects and FSR# in REMARKS box.

CHECKPOINTS	YES	NO	REMARKS
Check Plates For:			
1. Bending	✓		
2. Discoloration of Positives	✓		
3. Discoloration of Negatives	✓		
Check Bottom of Cells for Excess Sediment			
Check Cells for Cleanliness:			
1. Dust/Dirt	✓		
2. Acid Spills	✓		
Check Condition of Jars For:			
1. Cracks	✓		
2. Leaks	✓		
3. Signs of Deterioration	✓		
Check Condition of Battery Rack For:			
1. Corrosion	✓		
2. Stability	✓		
Check Liquid Levels, Note Cells and Amount Added			
Check Inter-Cell Connections, Battery Terminals For:			
1. Corrosion/Acid Build-up	✓		
2. Loose	✓		
Check that the Fan is Ventilating Room and operating Correctly	✓		
Check Tightness of Jumpers & Leads	✓		
Check Condition of Flame Arresters and Dust Caps	✓		
Check Condition of Floor Mat	✓		
Record Plate Cell Temperature	75	°F	50#
Lead-Calcium (Rectangular) Cells Only: Record Pilot Cell's Corrected Specific Gravity. (For every 3° above 77 °F add 0.001. For every 3° below 77 °F subtract 0.001.)			
Record Specific Gravity Temperature Correction Factor for Lead-Calcium (Rectangular) Battery.			
Battery Charger Data			
Float Volts: 131.3 DC	Equalize Volts: 131.2 DC	Timer Setting: _____ Hrs.	
Float Amps: 4 DC	Equalize Amps: 4 DC	Circle Mode: Auto/ Float/Equalize	
Ground Detection: + to Ground 13.29 VDC		Ground Detection: - to Ground 117.29 VDC	
Remarks: Samples 1/2 31/32			

Figure 8 Battery Test PG-2

11/0# 13582630

BATTERY DATA SHEET 2 of 2			
Location: <u>K04</u>		Date: <u>08/08/17</u>	Last Inspected: <u>6</u>
Battery Manufacturer: <u>LUCE</u>		Cell Type: <u>List 15</u>	# of Cells: <u>60</u>
AC Room: <u>#1</u>	DC Room:	Room Temperature: <u>•F</u>	
Record status and condition of batteries. Place an X in the YES box if operational with no defects. Record defects and FSR# in REMARKS box.			
CHECKPOINTS	YES	NO	REMARKS
Check Plates For:			
1. Bonding	✓		
2. Discoloration of Positives	✓		
3. Discoloration of Negatives	✓		
Check Bottom of Cells for Excess Sediment			
Check Cells for Cleanliness:			
1. Dust/Dirt	✓		
2. Acid Spills	✓		
Check Condition of Jars For:			
1. Cracks	✓		
2. Leaks	✓		
3. Signs of Deterioration	✓		
Check Condition of Battery Rack For:			
1. Corrosion	✓		
2. Stability	✓		
Check Liquid Levels, Note Cell#s and Amount Added			
Check Inter-Cell Connections, Battery Terminals For:			
1. Corrosion/Acid Buildup	✓		
2. Grease	✓		
Check that the Fan is Ventilating Room and operating Correctly	✓		
Check Tightness of Jumpers & Leads	✓		
Check Operation of Fume Arresters and Dust Caps	✓		
Check Condition of Floor Mat	✓		
Record Pilot Cell Temperature <u>#50</u>	<u>77</u>	•F	
Lead-Calcium (Rectangular) Cells Only: Record Pilot Cell's Corrected Specific Gravity. (For every 3° above 77 °F add 0.001. For every 3° below 77 °F subtract 0.001.)			
Record Specific Gravity Temperature Correction Factor for Lead-Calcium (Rectangular) Battery.			
Battery Charger Data			
Float Volts: <u>130.8</u> DC	Equalize Volts: <u>130.8</u> DC	Timer Setting: _____ Hrs.	
Float Amps: <u>2.6</u> DC	Equalize Amps: <u>2.6</u> DC	Circle Mode: Auto/ Float/Equalize	
Ground Detection: + to Ground <u>65.7</u> VDC		Ground Detection: - to Ground <u>65.3</u> VDC	