



WMSC Commissioner Brief: W-0143 – Evacuation for Life Safety Reasons – Capitol South Station – October 4, 2021

Prepared for Washington Metrorail Safety Commission meeting on January 25, 2022

Safety event summary:

A fluorescent light bulb tombstone connection in an escalator connecting the Capitol South Station platform to the station mezzanine failed, leading to a fire and a significant amount of dark smoke in the station while passengers were present.

The Station Manager turned the escalators off manually at approximately 9:10 p.m. Before the station manager returned to the kiosk to report the smoke, the smoke triggered a fire alarm in the Rail Operations Control Center (ROCC) at approximately 9:11 p.m. Also at 9:11 p.m., a Train Operator reported smoke coming from the platform escalators in the station. The Maintenance Operations Control (MOC) Communication desk in the ROCC communicated the alarm to the Rail Operations Information Center (ROIC) desk.

Review of CCTV video as part of this investigation showed light smoke was visible around the bottom of the platform escalators beginning around 9:07 p.m., and two customers observing an apparent issue with one of the escalators. Those customers then exited the station. Around 9:09 p.m., CCTV shows more significant white and black smoke visible just before Train 610 serviced the station and later continued toward Eastern Market Station. Riders who exited the train motioned to the Station Manager to come to the escalators. The Station Manager came to the escalators and manually stopped the escalators around 9:10 p.m., then returned to the kiosk intending to report the event. While the Station Manager was returning to the kiosk, the fire alarm activated. The Station Manager attempted to contact ROIC via radio on their Ops 5 channel at 9:12 p.m. regarding smoke coming from the escalator, but there was no response on the radio. They spoke with a ROIC specialist on the phone a few seconds later. The Station Manager reported heavy smoke and requested activation of station exhaust fans.

Train 912 traveling toward Federal Center SW was servicing and remained on the Capitol South Station platform from approximately 9:11 p.m. to 9:13 p.m. At 9:12:56 p.m., the Train Operator of Train 912 requested the Station Manager's presence due to smoke from the escalator. This was done on the Ops 2 radio channel used to communicate with ROCC controllers. Train 410 traveling from Federal Center SW toward Eastern Market Station was allowed to continue to and service Capitol South Station at approximately 9:13 p.m. while there was smoke on the platform. Customers boarded and exited the train.

At approximately 9:13 p.m., a ROCC Assistant Operations Manager called the District of Columbia for a Fire and Emergency Medical Services (FEMS) response.

Metrorail then suspended rail service in the area, and activated exhaust fans. All Metrorail customers were out of the station by 9:15 p.m.

FEMS established an incident command post at 9:22 p.m. The Station Manager reported at 9:39 p.m. that smoke had dissipated and that FEMS had given permission to reopen the station.

Probable Cause:



750 First St. NE • Ste. 900 • Washington, D.C. 20002

Office: 202-384-1520 • Website: www.wmsc.gov

The probable cause of this event was Metrorail's lack of proactive identification of equipment beyond its useful life as part of an effective hazard identification and management process, such as the hazards posed by fluorescent light housing in escalators that could be more safely transitioned to LED lighting.

Corrective Actions:

Following a hazard assessment and consideration of fire code and accessibility, Metrorail disconnected all under-step lighting on older escalators until light fixtures are replaced.

Metrorail is replacing existing fluorescent under-step lighting with LEDs to eliminate excess heat and reduce the likelihood of similar events in the future.

WMS staff observations:

This event provides an example of opportunities to proactively monitor all available data for hazards, as identifying this even more quickly when first indicated on CCTV would have presented an opportunity to keep additional trains and riders away from this fire and smoke.

Staff recommendation: Adopt final report.



Washington Metro Area Transit Authority
Department of Safety and Environmental
Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E21481

| | |
|---------------------------------------|--|
| Date of Event: | October 4, 2021 |
| Type of Event: | Evacuation for Life Safety |
| Incident Time: | 21:07 hours |
| Location: | Capitol South, Station |
| Time and How received by SAFE: | 21:13 hours SAFE IMO |
| WMSC Notification Time: | 22:34 hours |
| Responding Safety Officers: | WMATA SAFE: No WMSC: No Other: N/A |
| Rail Vehicle: | N/A |
| Injuries: | None |
| Damage: | None |
| Emergency Responders: | None |
| SMS I/A Incident Number: | 20211005#95983MX |

Capitol South Station – Evacuation for Life Safety

October 4, 2021

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Abbreviations and Acronyms

| | |
|-----------------|--|
| AIMS | Advanced Information Management System |
| ARS | Audio Recording System |
| COO | Office of the Chief Operating Officer |
| CCTV | Closed Circuit Television |
| DCFEMS | District of Columbia Fire and Emergency Medical Services |
| ELO | Emergency Medical Liaison Officer |
| ELES | Office of Elevator and Escalator |
| FLO | Fire Liaison Officer |
| MSRPH | Metro Safety Rules Procedures Handbook |
| MOC COMM | Maintenance Operations Center Communications Desk |
| NOAA | National Oceanic and Atmospheric Administration |
| ROIC | Rail Operations Information Center |
| RTC | Rail Traffic Controller |
| RTRA | Office of Rail Transportation |
| PM | Preventative Maintenance |
| SRC | Safety Risk Coordinator |
| SOP | Standard Operating Procedure |
| WMSC | Safety Measurement System Incidents/Accidents |
| SMS I/A | Washington Metrorail Safety Commission |

Washington Metropolitan Area Transit Authority
Department of Safety & Environmental Management
FINAL REPORT OF INVESTIGATION A&I E21481

Executive Summary

On Monday, October 4, 2021, at approximately 21:11 hours, the Rail Operations Control Center (ROCC) received an Advanced Information Management System (AIMS) notification of an active fire alarm at Capitol South Station. MOC Communication desk notified the Rail Operations Information Center (ROIC) Information Specialist of the active alarm at Capitol South Station moments later. At 21:12 hours, Train ID 902 heading in Largo Town Center's direction notified the ROCC Rail Traffic Controller (RTC) that a Station Manager was needed to investigate a smoke condition at Capital South escalator, later identified as escalators #4 and #5.

At approximately 21:13 hours, the System Data Recording System indicated that the ROCC Assistant Operations Manager notified District of Columbia Fire and Emergency Medical Services (DCFEMS) of an active fire alarm at Capitol South. Train ID 912 on Track 1 and Train ID 412 on Track 2 departed Capitol South Station and were the last trains to service the station. ROCC then suspended service between Eastern Market and Federal Center Southwest. At approximately 21:14 hours, ROCC activated exhaust fans at Capitol South Station and commanded breakers open to deenergize third rail power.

At approximately 21:22 hours, the DCFEMS arrived on scene and established the Incident Command Post (ICP) at the top of the platform escalators. Seventeen minutes later, at approximately 21:39 hours, the Station Manager reported all smoke dissipated at Capitol South Station, reported the station safe for train movement, and per the DCFEMS, the station could be reopened for revenue service.

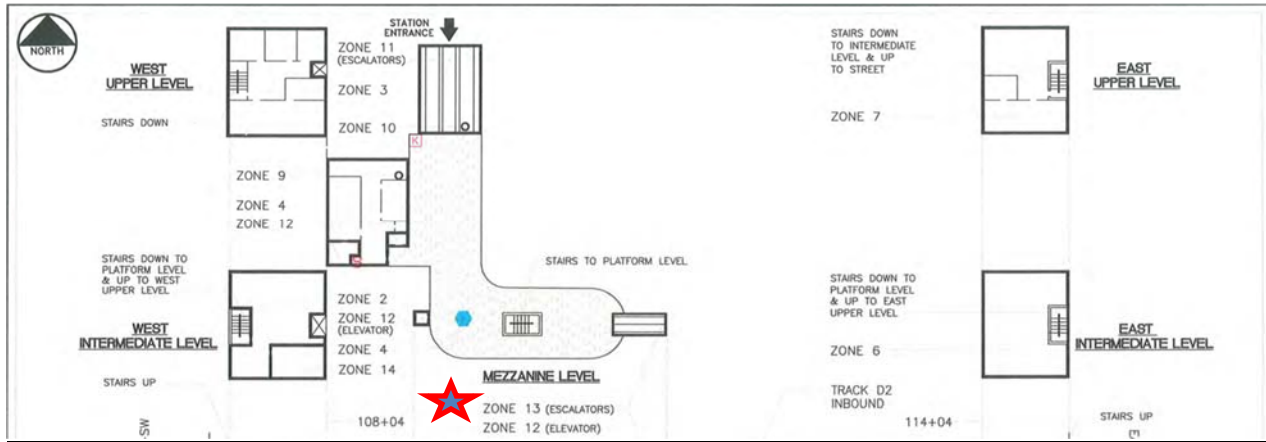
The Washington Metrorail Safety Commission (WMSC) authorized the event scene release at approximately 21:48 hours. ROCC commanded breakers closed at approximately 21:49 hours and resumed normal service.

The probable cause of the October 14, 2021, evacuation for life safety reason event at Capitol South Station was a failure of the left side florescent bulb tombstone connection, located in the lower portion of the escalator unit step band under-step lighting. The fire was contained to the lower part of the escalator with some residual damage to step demarcations located close to the heat source.

Incident Site

Capitol South Station, Track 2

Field Sketch/Schematics



**Not to scale*

Purpose and Scope

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

Investigation Process and Methods

Upon receiving the notification of the Capitol South Station Evacuation for Life Safety Reasons event on October 4, 2021, SAFE launched an investigation into this event. SAFE team members worked with relevant Washington Metropolitan Area Transit Authority (WMATA) subject matter experts to review the incident's facts and data.

Investigation Methods

The investigative methodologies included the following:

Formal Interview – No interviews were conducted as part of this investigation.

- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information.
- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
 - Rail Operations Information Center (ROIC) Report
 - Maximo System Data
 - Office of Elevator and Escalator (ELES) Engineering Report
 - Metrorail Safety Rules and Procedures Handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA)
- System Data Recording Review – A collection of information in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback [Radio and Ambient]
 - Closed Circuit Television (CCTV)

- Advanced Information Management System (AIMS) Event log.

Investigation

On Monday, October 4, 2021, at approximately 21:07 hours, CCTV playback showed light smoke visible around the bottom of the platform escalators at Capitol South Station. Two customers who exited Train ID 903 on Track 1 pointed at escalator #4 (descending) while riding ascending escalator #5.

At approximately 21:09 hours, white and black smoke became visible. At approximately 21:10 hours, the Station Manager arrived at the escalators and manually stopped the escalators. The Station Manager then returned to the kiosk to report the event to ROIC. CCTV footage also showed that at approximately 21:11 hours, a customer used escalator #5 (stopped) to descend to the platform and took a video of the smoking event on their cell phone.

Advanced Information Management System

At approximately 21:11 hours, the ROCC received an AIMS notification of an active fire alarm at Capitol South Station. MOC Communication desk subsequently notified the ROIC Information Specialist of the active alarm at Capitol South Station moments later. At approximately 21:12 hours, Train ID 902 heading in Largo Town Center's direction notified the ROCC RTC that a Station Manager was needed to investigate a smoke condition at Capital South escalator, later identified as escalators #4 and #5.



Figure 1 = Train ID arriving at Capitol South Station 21:11 hours

At approximately 21:13 hours, the System Data Recording System revealed that the ROCC Assistant Operations Manager notified DCFEMS of an active fire alarm at Capitol South Station. Train ID 912 on Track 1 and Train ID 412 on Track 2 departed Capitol South Station and were the last trains to service Capitol South Station.

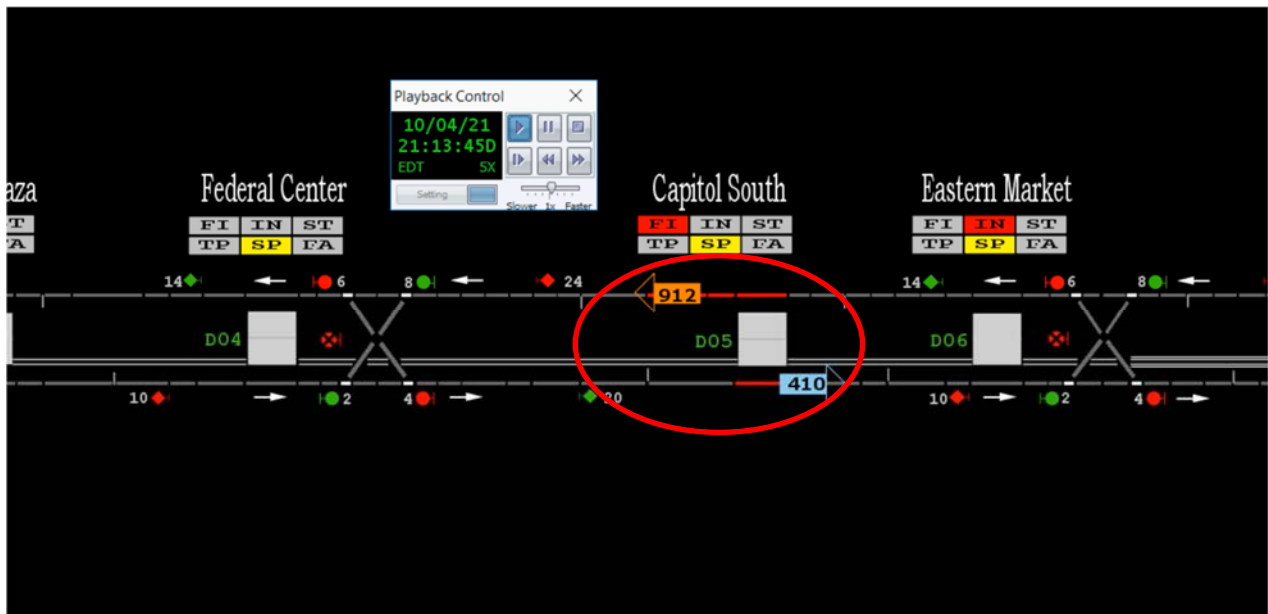


Figure 2 - Train ID 912 and Train ID 410 departing Capitol South Station at 21:13 hours

ROCC then suspended service between Eastern Market and Federal Center SW. At approximately 21:14 hours, ROCC activated exhaust fans at Capitol South Station and commanded breakers open to deenergize third rail power.



Figure 3 - ROCC commanded third rail power breakers open at approximately 21:19 hours

At approximately 21:22 hours, the DCFEMS arrived on scene and established the ICP at the top of the platform escalators. Seventeen minutes later, at approximately 21:39 hours, the Station Manager reported the smoke dissipated at Capitol South Station, reported the station safe for train movement and, per the DCFEMS, the station could be reopened for revenue service.



Figure 4 -ROCC commanded third rail power breakers closed at approximately 21:49 hours.

The WMSC authorized scene release at 21:48 hours. ROCC commanded breakers closed at approximately 21:49 hours and resumed normal service. An on-site ELES engineering investigation determined the source of the smoke condition was attributed to escalator under step lighting. The fire originated in the lower portion within the step band, escalator “under step” lighting.

Incident Scene Photographs

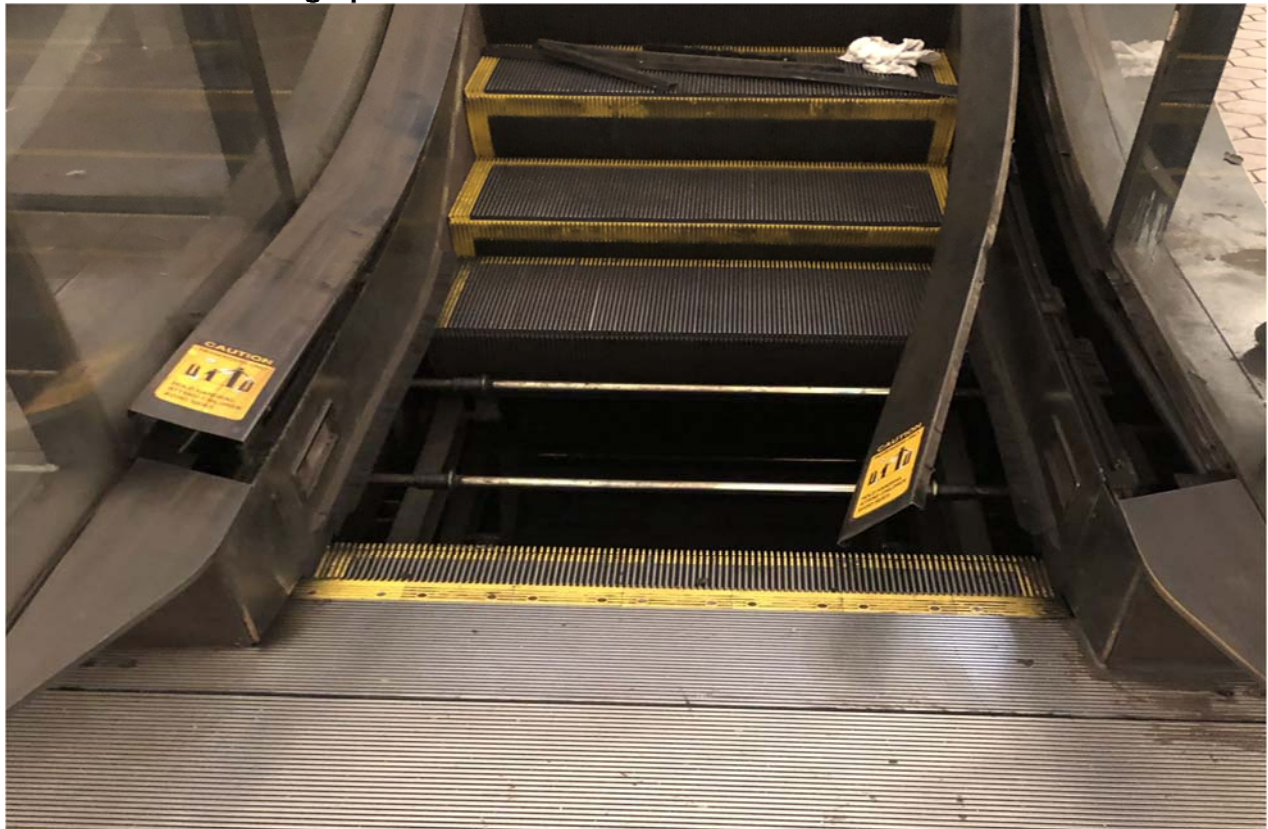


Figure 5 - Escalator #4 Platform Level affected area.

The “under step” lighting consists of two separate florescent tube housings fed by one circuit. The fire originated from a failed tombstone connection with the fluorescent bulb on the left side, top unit of the consist.



Figure 6 - Florescent Bulbs Inside Lower Portion of Escalator #4

The fire was contained to the lower part of the escalator with some residual damage to step demarcations located close to the heat source.

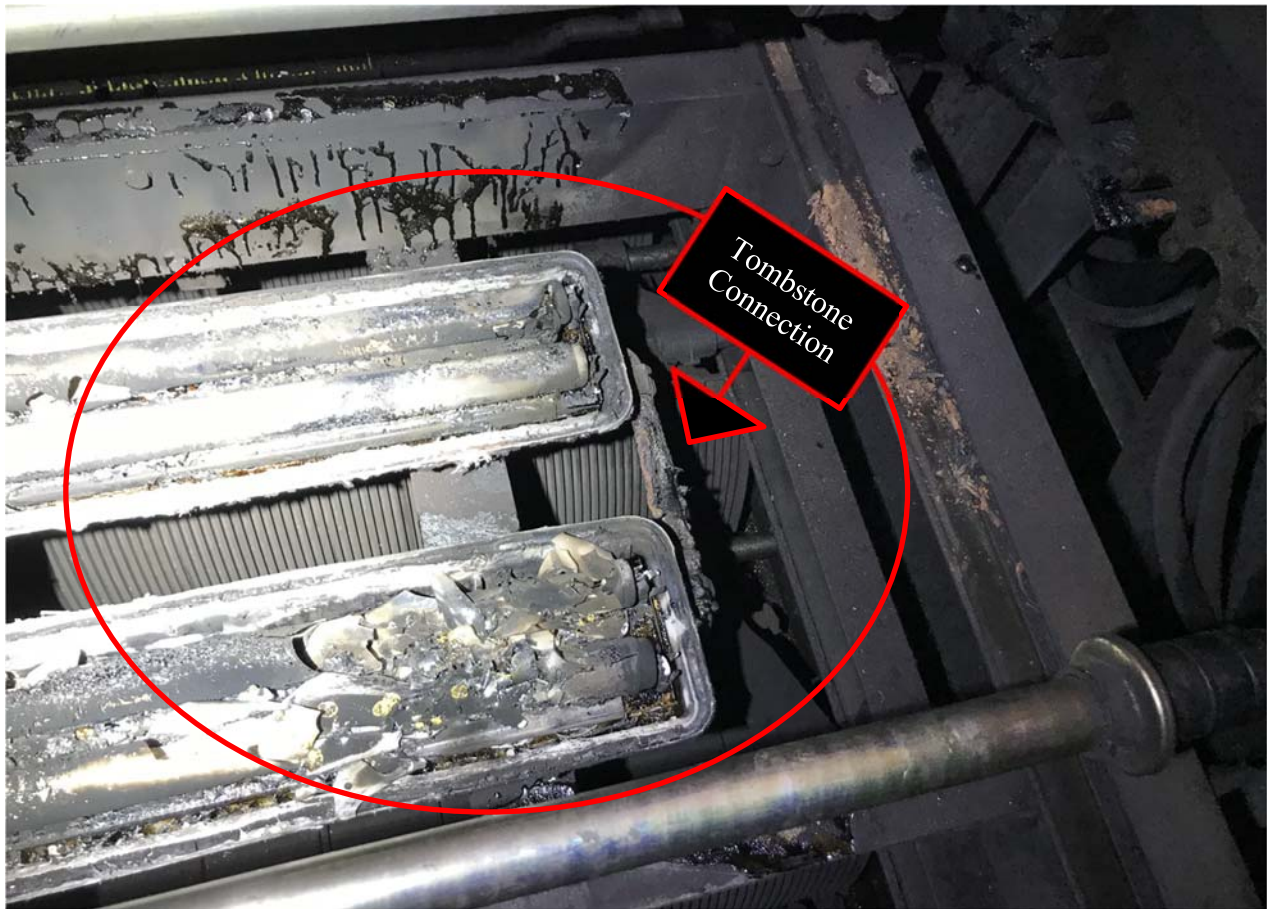


Figure 7 - Escalator #4 under step lighting and tombstone connection.

Chronological Event Timeline

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

| Time | Description | Source |
|---------------------------|--|--------|
| 21:07:07 hours | Light smoke began to be visible around the bottom of the platform escalators. Two customers who exited Train ID 903 on Track 1 pointed at escalator #4 (descending) while riding the ascending escalator. Four Customer walked past the kiosk with stopping. | CCTV |
| 21:07:56 hours | Customers who initially motioned toward escalator #4 exited the Station | CCTV |
| 21:09:15 hours | White and black smoke becomes more visible. | CCTV |
| 21:09:29 hours | <u>Train ID 610</u> : Serviced Capitol South Station on Track 1. Customers observed motioning towards the escalator. | CCTV |
| 21:10:30 hours | Customers who exited Train 610 motion towards Station Manager (off screen) towards the escalator. | CCTV |
| 21:10:58 - 21:11:14 hours | <u>Station Manager</u> : Arrived at escalators and stopped escalators manually and then goes back to the kiosk to report the event to ROIC. | CCTV |

| Time | Description | Source |
|---------------------------|---|----------------|
| 21:11:28 hours | Customer used stopped escalator to descend to platform and takes video of the smoking event on their cell phone. | CCTV |
| 21:11:39 hours | D05-1 Fire Alarm CURRENT STATE = Active | AIMS Event Log |
| 21:11:49 hours | <u>Train ID 912</u> : Arrived on Track 2. Passes escalators and stops with Lead car on the far end of the platform away from the escalator. | CCTV |
| 21:12:15 hours | D05-1 Fire Alarm CURRENT STATE = Active ACKNOWLEDGED | AIMS Event Log |
| 21:12:15 hours | <u>Comm Desk</u> : Reported an Active Fire Alarm to MOC Assistant Superintendent. | Phone |
| 21:12:23 hours | <u>Train ID 912</u> : Serviced Capitol South Station, Track 2. | CCTV |
| 21:12:35 hours | <u>COMM Desk</u> : Reported an Active Fire Alarm at Capitol South Station to the ROIC Information Specialist. | Phone |
| 21:12:44 hours | <u>Station Manager</u> : (Mezz 59) contacted ROIC. No response. Seen on camera with radio in hand by escalator. | Ops 5 / CCTV |
| 21:12:56 hours | <u>Train ID 912</u> : requested Station Manager due to smoke coming from the escalator (does not provide ID). | Ops 2 |
| 21:13:00 hours | <u>ROIC</u> : Contacted the Station Manager to notify them of an active fire alarm. <u>Station Manager</u> : Reported they had heavy smoke coming from the platform escalator. The Station Manager reported they did not see any signs of fire and requested they activate the exhaust fans. | Phone |
| 21:13:11 hours | <u>Train ID 410</u> : Serviced Capitol South Station, Track 1. Two customers exit onto the platform. Customer who took video boards the train at same door as customers exiting. | CCTV/SPOTS |
| 21:13:00 – 21:16:00 hours | ROCC began holding trains at stations outside of Capitol South; dispatched supervisors; made blanket announcement of service suspension and turnbacks at Eastern Market and Federal Center SW. | Ops 2 |
| 21:13:27 hours | <u>Assistant Operations Manager</u> : Notified DCFEMS of an active fire alarm at Capitol South Station. | Phone |
| 21:13:34 hours | <u>Train ID 912</u> : Began to depart on Track 2 | CCTV |
| 21:13:37 hours | <u>Train ID 410</u> : Began to depart on Track 1 | CCTV |
| 21:14:00 hours | <u>ROIC Information Specialist</u> : Contacted ROCC Operations Manager and notified them of an active fire alarm at Capitol South with heavy smoke coming from the escalators. ROIC then requested the OM have the fans activated. <u>Operations Manager</u> : Acknowledged ROIC's notification. | Phone |

| Time | Description | Source |
|------------------------------|--|------------------------------|
| 21:14:06 hours | Exhaust Fans Activated | AIMS Event Log |
| 21:14:45 hours | Two customers who exited Train 410 board ascending escalator out of the station. Station clear of customers. | CCTV |
| 21:15:20 hours | DCFEMS: Dispatched Engine 13, Truck 13 to 355 First Street NE for a commercial fire alarm for Zone 13 top escalator activation. | Open MHZ Fire Main |
| 21:16 58 hours | <u>ROCC Fire Liaison Officer (FLO)</u> : Communicated with DCFEMS and requested a VOC for smoke on the platform at Capitol South Station. | Open MHZ Fire Main |
| 21:17:31 hours | <u>ROCC FLO</u> : Contacted Engine 13 and Truck 13 and communicated smoke was possibly related to the escalator and they are discontinuing service. | Open MHZ Fire Main |
| 21:19:00 hours | <u>DCFEMS ELO</u> : Called to gather further information surrounding the smoke event. <u>ROCC FLO</u> : The Station Manager reported smoke emitting from escalators #4 and #5 on the platform level, and the station was empty except for the Station Manager. <u>DCFEMS Emergency Medical Liaison Officer (ELO)</u> : Notified the ROCC FLO that Battalion 6 and special ops would be responding. | Phone |
| 21:19:32 – 21:19:34 hours | Breakers Commanded Deenergized | AIMS Event Log |
| 21:20:05 hours | DCFEMS dispatcher: “Metro Station VOC alarm Engine 32, 6, 16, and 12. Truck 13 and 4 Battalion 6 Battalion Chief and Special Operations. EMS 2 and Medic 3 EMS 13 and safety respond for reports of smoke on the platform at Capitol South Metro at 355 First Street SE.” | Open MHZ Fire Dispatch |
| 21:22:00 hours | <u>DCFEMS</u> : Arrived at Capitol South Station and established Incident Command (IC) at the top of the platform escalators. | Phone |
| 21:32:55 hours | <u>ROCC FLO</u> : Contacted Engine 13 and requested if there was something burnt up in the escalator and to ascertain for ROCC that it was not on the roadway. <u>DCFEMS Engine 13</u> : Confirmed escalator #4. | Open MHZ Fire Main |
| 21:34:22 hours | <u>ROCC FLO</u> : Notified the Battalion Chief that Metro was looking to reenergize third rail power and wanted to make sure DCFEMS was okay with the request. <u>DCFEMS Engine 13</u> : Authorized ROCC to reenergize third rail power. | Open MHZ Fire Main |
| 21:39:00 hours | <u>Station Manager</u> : Reported all smoke dissipated at Capitol South Station, station safe for train movement and, per the DCFEMS, the station could be reopened for revenue service. <u>MTPD</u> : Released the station back to operations personnel and reported Capitol South Station can be reopened for revenue service. | Ops 5 / ROCC Incident Report |
| 21:49:00 hours | ROCC remotely commanded third rail breakers closed to restore power at Capitol South Station, Track 1 and 2. | AIMS |

Note: Times above may vary from other system's timelines based on clock settings.

Office of Elevator and Escalator (ELES) Engineering Report

“On October 5, 2021, ELES Engineering arrived on site to investigate the cause(s) of fire within the escalator. After determining the fire originated in the lower portion within the step band, escalator “under step” lighting, it was further determined which component and what side the malfunction occurred. “Under step” Lighting consists of two separate florescent tube housings fed by one circuit. The fire originated from a faulty tombstone connection with the fluorescent bulb on the left side, top unit of the consist. The fire was contained to the lower part of the escalator with some residual damage to step demarcations located close to the heat source.”

Hotwash Notes – 10/08/21 09:30-10:06 Hours

Respective stakeholders from SAFE, ELES, and the COO discussed the escalator smoke event. During the hot wash, it was determined there were 99 replacement LEDs in stock with 160 to be replaced (initial count). ELES plans to inspect all lights during their next Preventative Maintenance (PM) cycle with guidance from escalator engineer group for signs of failure.

The respective stakeholders further discussed, whether to disconnect the lights until replacements are installed. The discussion determined this is required per code for older escalators, but not in new units. SAFE to perform Hazard Analysis and issue exception letter if determined to be acceptable risk.

RTRA to collect written statements from involved personnel (Train Operators, Station Manager)
FSVT to produce overall counts of similar equipment in use within the system (e.g., fluorescent light fixtures).

Immediate Mitigation to Prevent Recurrence

- ELES will disconnect the older escalator lights until replacement are installed. This is not required by code for new units. Disconnection of the lights was reviewed and approved by WMATA's ADA office and Fire Marshal.
- ELES plans to inspect all lights during their next Preventative Maintenance (PM) cycle with guidance from escalator engineer group for signs of failure.

Investigative Findings

- The fire resulted from a faulty tombstone on the left side florescent bulb assembly. located on the under-step lighting at the lower portion of the unit.

Weather

At the time of the incident, National Oceanic and Atmospheric Administration (NOAA) recorded the temperature as 71°F with an overcast. The relative humidity was 94% with a ten-mile visibility. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: Washington, DC.)

Human Factors

There were no associated human factors identified that may have contributed to the smoke condition at Capitol South Station.

Post-Incident Toxicology Testing

There was no Post Incident testing conducted on any employees responding, managing, or involved in the evacuation for life safety reasons event.

Probable Cause

The probable cause of the October 14, 2021, evacuation for life safety reason event at Capitol South Station was a failure of the left side florescent bulb tombstone connection, located in the lower portion of the escalator unit step band under-step lighting. The fire was contained to the lower part of the escalator with some residual damage to step demarcations located close to the heat source.


Recommendations/Corrective Actions

The following are the recommendations and corrective actions identified as a result of this investigation. 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 | Targeted Completion Date |
|-------------------------|--|-------------------|--------------------------|
| 95983_SAFECAPS_ELES_001 | (RC-1,) ELES shall remove and replace all existing florescent light housing from all units and install LED to eliminate excess heat and reduce the chance of connectivity issues with the under-step lighting. | ELES/SRC | March 1, 2022 |
| 95983_SAFECAPS_ELES_002 | (RC-1-CF-2) ELES shall disconnect all under-step lighting on older escalators until repairs are completed. Virginia and District of Columbia Complete. The State of Maryland declined to allow WMATA to disconnect the underlighting | ELES/SRC | February 1, 2022 |
| 95983_SAFECAPS_SAFE_001 | In coordination with WMATA's ADA office, SAFE performed a hazard assessment on disconnecting the existing fluorescent lights and issued an exception letter for the respective Fire Code. | SAFE SRC | February 1, 2022 |

Appendices

Appendix A – ELES Engineering Report

| | | | | |
|---|--|-----------------------|---------------|-------------------|
|  | WASHINGTON METRO AREA TRANSIT AUTHORITY WMATA/ELES Engineering group | | | |
| | Owner: | WMATA/ELES | Department: | Engineering Group |
| | Subject: | D05x04 Escalator Fire | Inspected By: | |
| | Location: | Capitol South | Date: | 10-5-2021 |

Incident: On October 4, 2021 at 9:15 PM, A small fire at Capitol South escalator (D05X04) was reported with smoke emitting from the lower portion of the escalator onto the platform. Request for a post incident investigation and root cause analysis by the engineering group was requested.

Investigation: On October 5, 2021 ELES Engineering arrived on site to investigate the cause(s) of fire within the escalator. After determining the fire originated in the lower portion within the step band, escalator “under step” lighting, it was further determined which component and the what side the malfunction occurred. “Under step” Lighting consists of two separate florescent tube housings fed by one circuit. The fire originated from a faulty tombstone connection with the fluorescent bulb on the left side, top unit of the consist. The fire was contained to the lower part of the escalator with some residual damage to step demarcations located close to the heat source.



Florescent light housings lower portion of Escalator. Notice top housing were electrical fire ignited.

Attachment 1 – ELES Engineering Report page 1 of 3.



Top housing left side
where fire originated.



Tombstone connection
to florescent bulb.

Attachment 1 – ELES Engineering Report page 2 of 3.

Engineering Recommendations:

- Remove all existing florescent light housings from all units and install LED style. This will help eliminate excess heat and reduce chance of connectivity issues with under step lighting.
Replacement WMATA part # **R38301286**



Figure 1 R38301286 LED Demarcation Light

Attachment 1 – ELES Engineering Report page 3 of 3.