



WMSC Commissioner Brief: W-0255 – Evacuation for Life Safety Reasons – Shaw-Howard University Station – August 31, 2023

Prepared for Washington Metrorail Safety Commission meeting on January 23, 2024

Safety event summary:

On Thursday, August 31, 2023, Shaw-Howard University Station and a Green Line train were evacuated for life safety reasons. Several riders had a miscommunication, possibly due partly to a language barrier, which led to a rider communicating to the Train Operator on the train intercom that they believed one of the other riders had a bomb.

At 12:58 p.m., the Train Operator reported this communication to the Radio Rail Traffic Controller in the Rail Operations Control Center (ROCC), and at 1:01 p.m., the train was offloaded at Shaw-Howard University Station.

The ROCC Assistant Operations Manager and the Metro Transit Police Department (MTPD) were notified. MTPD notified the District of Columbia Office of Unified Communication and dispatched the MTPD Explosive Ordnance Disposal Unit.

The station was evacuated, and a command post was established by MTPD. At 1:16 an MTPD K-9 Unit and the Explosive Ordnance Disposal Unit began an inspection of the station's platform and the train. No hazardous materials were found, and the station was allowed to reopen 1:29 p.m.

Probable Cause:

The probable cause of this event was an incorrect communication by a Metrorail rider.



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

FINAL REPORT OF INVESTIGATION A&I E23604

Date of Event:	August 31, 2023
Type of Event:	Evacuation for Life Safety Reasons
Incident Time:	12:58 Hours
Location:	Shaw-Howard University Station, track 1
Time and How received by SAFE:	13:00 Hours – SAFE/MAC
WMSC Notification Time:	13:25 Hours
Responding Safety Officers:	WMATA: None WMSC: None Other: None
Rail Vehicle:	Train ID 502 (L7608-7609, 7613-7612, 7536-7537, 7643-7642T)
Injuries:	None
Damage:	None
Emergency Responders:	District of Columbia Fire and Emergency Medical Services (DCFEMS) Metro Transit Police Department (MTPD) Explosive Ordnance Disposal (EOD)
SMS I/A Incident Number:	20230831#111059MX

Shaw-Howard University Station – Evacuation for Life Safety Reasons

August 31, 2023

Table of Contents

Abbreviations and Acronyms-----	3
Executive Summary -----	4
Incident Site -----	4
Field Sketch/Schematics -----	4
Purpose and Scope -----	5
Investigative Methods-----	5
Investigation -----	5
Chronological Event Timeline-----	6
Advanced Information Management System (AIMS) -----	8
Office of Systems Maintenance, Office of Radio Communications (COMR) -----	8
Interview Findings-----	9
Weather -----	9
Related Rules and Procedures -----	9
Human Factors -----	9
Post-Incident Toxicology Testing -----	9
Findings -----	9
Immediate Mitigation to Prevent Recurrence -----	9
Probable Cause Statement-----	9
Recommended Corrective Actions -----	10
Appendices -----	11
Appendix A – Interview Summary -----	11
Appendix B – MTPD Event Report -----	12
Appendix C – ROCS SPOTS Report -----	17
Appendix E – Why-Tree Analysis -----	18

Abbreviations and Acronyms

AIMS	Advanced Information Management System
AOM	Assistant Operations Manager
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
COMR	Office of Radio Communications
DCFEMS	District of Columbia Fire and Emergency Services
EOD	Explosive Ordnance Disposal
MOR	Metrorail Operating Rulebook
MSRPH	Metrorail Safety Rules and Procedures Handbook
MTPD	Metro Transit Police Department
NOAA	National Oceanic and Atmospheric Administration
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
ROCC	Rail Operations Control Center
SAFE	Department of Safety
SMS	Safety Measurement System
SOCC	Security Operations Control Center
SPOTS	System Performance On-Time Summary
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

**Washington Metropolitan Area Transit Authority
Department of Safety – Office of Safety Investigations**

Executive Summary

**Note that all times listed are approximate and may contain minor variations due to differences between systems of record. **

On Thursday, August 31, 2023, at 12:58 hours, the Train Operator of Train ID 502 (L7608-7609, 7613-7612, 7536-7537, 7643-7642T) reported to the Rail Operations Control Center (ROCC) that a passenger used the emergency intercom to make a bomb threat while the train was approaching Shaw-Howard University Station on track one.

The Radio Rail Traffic Controller (RTC) instructed the Train Operator to make announcements to the customers, offload the train, verify that the consist was clear of customers, and check for any suspicious items aboard the train.

The Button RTC notified the Assistant Operations Manager (AOM), then Metro Transit Police Department (MTPD). MTPD notified the District of Columbia Office of Unified Communications of the report and dispatched the Explosive Ordnance Disposal (EOD) unit.

At 13:05 hours, the Train Operator reported that the train was clear of customers and no suspicious items had been found. Shaw-Howard University Station was evacuated for safety precautions.

At 13:11 hours, MTPD arrived and established the Command Post. At 13:16 hours, the EOD unit arrived and inspected the consist. At 13:22 hours, MTPD reported the inspection was complete with negative results. Train ID 502 was released, and Shaw-Howard University Station was reopened.

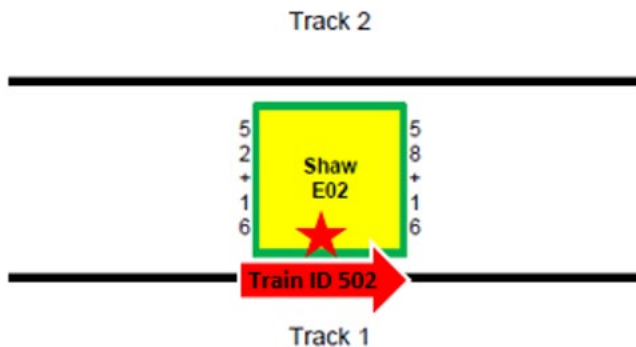
No injuries or damage resulted from this event.

The probable cause of the Evacuation for Life Safety Reasons event on August 31, 2023, at Shaw-Howard University Station was due to a bomb threat onboard the train.

Incident Site

Shaw-Howard University Station, track 1

Field Sketch/Schematics



The above depiction is not to scale.

Purpose and Scope

The purpose of this accident 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.

Investigative Methods

The investigative methodologies included the following:

- Site Assessment through video and document review
- Formal Interviews – SAFE interviewed one individual as part of this investigation. The interview included 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 interviewed the following individual:
 - Incident Commander
- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information. Written statements were reviewed by personnel present during the event.
- Documentation Review – Collection of relevant work history information and process documentation contained in WMATA systems of record. These records include:
 - Metrorail Safety and Procedure Handbook (MSRPH)
 - Metrorail Operating Rulebook (MOR)
 - National Oceanic and Atmospheric Administration (NOAA)
 - Rail Operations Control Center (ROCC) Incident Report
 - RTRA Supervisor’s Report
 - MTPD Event Report
 - MTPD Hotwash Report
- System Data Recording Review – Collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) Playback
 - Closed-Circuit Television (CCTV)
 - Advanced Information Management System (AIMS)
 - System Performance On-Time Summary (SPOTS)

Investigation

On Thursday, August 31, 2023, at 12:58 hours, the Train Operator of Train ID 502 (L7608-7609, 7613-7612, 7536-7537, 7643-7642T) reported to ROCC that a passenger used the emergency intercom to make a bomb threat while the train was approaching Shaw-Howard University Station on track one.

The Radio RTC instructed the Train Operator to make announcements to the customers, offload the train, verify that the consist was clear of customers, and check for any suspicious packages aboard the train.

The Button RTC notified the AOM, then MTPD. MTPD notified the Office of Unified Communications of the report and dispatched the EOD unit.

The Audio Recording System (ARS) revealed that at 12:59 hours, the Train Operator advised that the report was from rail car 7643.

At 13:00 hours, the Radio RTC instructed the Train Operator to perform a radio check with their handheld radio. The Train Operator advised that the train was keyed down and announcements to customers were completed. The Radio RTC instructed the Train Operator to walk through the consist and look for suspicious items and passengers.

At 13:04 hours, MTPD Communications notified the District of Columbia (DC) Office of Unified Communications regarding the situation.

At 13:05 hours, the Train Operator reported that the train was clear of customers and no suspicious packages had been found. Shaw-Howard University Station was evacuated for safety precautions.

At 13:06 hours, the Button RTC advised personnel to evacuate Shaw-Howard U Station.

An MTPD unit was dispatched to Shaw-Howard University Station to download a video from the train. At 13:11 hours, an MTPD Officer arrived at the scene, began their investigation, and established the Incident Command Post. At 13:16 hours, the EOD unit arrived and inspected the consist. At 13:17 hours, MTPD advised that trains could bypass the station.

At 13:18 hours, the Radio RTC announced that trains were single-tracking between Mount Vernon Square Station and U Street Station. All trains were instructed to bypass Shaw-Howard University Station.

At 13:22 hours, EOD reported that the inspection was complete with negative results. Train ID 502 was released, and Shaw-Howard University Station was reopened.

At 13:26 hours, the Radio RTC instructed the Train Operator to key up on the Branch Avenue end of the train, reblock to Train ID 702, and to transport the consist to Branch Avenue Yard for further inspection by MTPD.

At 13:29 hours, the Radio RTC announced that the Shaw-Howard University Station reopened for normal service.

At 14:01 hours, Train ID 502 arrived at Branch Avenue Yard and was secured on track 15.

Chronological Event Timeline

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

Time	Description
12:58:18 hours	<u>Train ID 502</u> : Arrived at Shaw-Howard University Station. [SPOTS]
12:58:53 hours	<u>Train ID 502</u> : Reported a bomb threat as the train arrived at Shaw-Howard Station on track 1. <u>Radio RTC</u> : Acknowledged. [Radio OPS 3]

Time	Description
12:59:19 hours	<u>Radio RTC</u> : Inquired what car the report was made from. <u>Train ID 502</u> : Responded to car number 7643. <u>Train ID 502</u> : Reported the person who made the bomb threat was wearing all white and a face covering. <u>Radio RTC</u> : Requested a radio check from the Train Operator on the handheld radio. [Radio OPS 3]
13:00:26 hours	<u>Train ID 502</u> : Provided a radio check from the handheld radio and advised that the train was keyed down and made announcements. [Radio OPS 3]
13:01:04 hours	<u>Radio RTC</u> : Instructed to inspect and report if a suspicious item was found. [Radio OPS 3]
13:01:16 hours	<u>Button RTC</u> : Notified the AOM, then the MTPD of the report. [Phone Rail 2]
13:01:27 hours	<u>Radio RTC</u> : Instructed the Train Operator to offload the train. [Radio OPS 3]
13:03:32 hours	<u>Train ID 502</u> : Advised that the train was offloaded. <u>Radio RTC</u> : Inquired if any suspicious items were found. [Radio OPS 3]
13:03:57 hours	<u>MTPD Dispatcher</u> : Instructed units to respond to Shaw-Howard Station. [Radio MTPD 1X]
13:04:24 hours	<u>MTPD Communications</u> : Notified the Office of Unified Communications. [Phone SOCC]
13:04:35 hours	<u>Train ID 502</u> : Reported no personnel, customers, or suspicious items were on the train. [Radio OPS 3]
13:06:54 hours	<u>Button RTC</u> : Advised to evacuate the Shaw-Howard U Station. [CTF ROCC Rail Phone]
13:07:20 hours	<u>MTPD Dispatcher</u> : Advised that a unit was dispatched to download video from the train. [Radio MTPD 1X]
13:07:21 hours	<u>Radio RTC</u> : Instructed to standby for MTPD. <u>Train ID 502</u> : Acknowledged. [Radio OPS 3]
13:07:53 hours	<u>Radio RTC</u> : Requested a description of the person reporting the threat. <u>Train ID 502</u> : Responded a female wearing a white face covering. [Radio OPS 3]
13:09:32 hours	<u>MTPD Unit</u> : Advised located at Shaw-Howard Station. [Radio MTPD 1X]
13:12:12 hours	<u>Radio ROCC</u> : Announced an emergency event occurring at Shaw-Howard Station. [Radio OPS 3]
13:16:00 hours	<u>Train ID 502</u> : Reported that MTPD K-9 Unit had arrived on the platform and began the inspection. [Radio OPS 3]
13:17:34 hours	<u>MTPD Unit</u> : Advised that trains could bypass the station [Radio MTPD 1X]
13:17:37 hours	<u>Radio RTC</u> : Announced for trains to bypass Shaw-Howard Station. [Radio OPS 3]
13:18:00 hours	The Radio RTC announced that trains were single-tracking between Mount Vernon Square Station and U Street Station and bypassing Shaw-Howard University Station. [Radio OPS 3]
13:22:19 hours	<u>MTPD Unit</u> : Reported the inspection was complete with negative results. [Radio MTPD 1X]
13:23:10 hours	<u>MTPD Unit</u> : Advised that the train was released. [Radio MTPD 1X]
13:26:07 hours	<u>Radio RTC</u> : Instructed the Train Operator to key up on the Branch Avenue end of the train and dispatched the train to Branch Avenue Yard. <u>Train ID 502</u> : Acknowledged and repeated. [Radio OPS 3]
13:29:39 hours	<u>Radio RTC</u> : Announced that the Shaw-Howard U Station was back in service. [Radio OPS 3]
13:31:56 hours	<u>Train ID 502</u> : Departed Shaw-Howard University Station. [SPOTS]

Time	Description
14:01:00 hours	Train ID 502 arrived at Branch Avenue Yard. [Radio BA YD2]

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

Advanced Information Management System (AIMS)

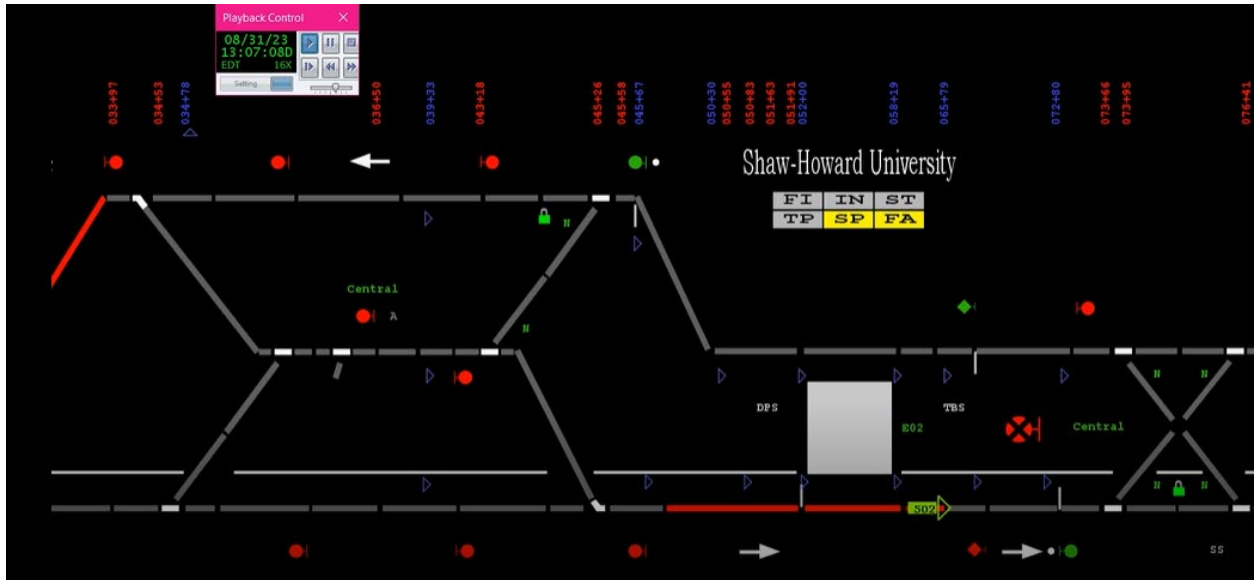


Figure 1 – AIMS Playback depicting Train ID 502 located at Shaw-Howard U Station at 13:07 hours.

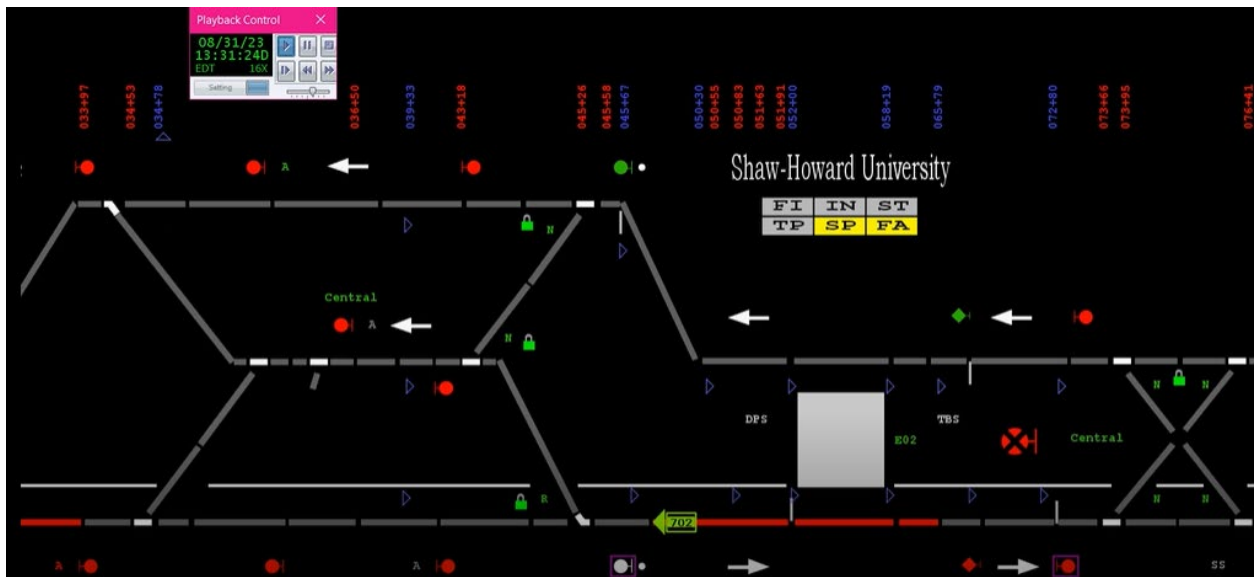


Figure 2 – AIMS Playback depicting Train ID 502 travelling towards Branch Avenue Station.

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

The Office of Radio Communication conducted comprehensive radio checks (TX/RX) at Shaw-Howard University Station on tracks 1 and 2. No issues were identified.

Interview Findings

As part of the investigation launched into the event, SAFE interviewed one person. The interview identified the following key findings associated with this event. Findings detailed below include reported information from involved personnel and may conflict with other data sources contained in the report.

Incident Commander

- The Incident Commander stated that they established the Command Post and staged the Explosive Ordnance Disposal (EOD) and K-9 response.
- The Incident Commander stated that during the investigation, they learned of a person of interest and the possible location of the individual.
- The Incident Commander stated that the individual was located and interviewed.
- The Incident Commander stated that they determined that it was appropriate to continue the inspection process at a secondary location.

Weather

On August 31, 2023, at the time of the incident, NOAA recorded the temperature as 77°F, with partly clear skies, winds at 11.9 mph, and 41% humidity. Weather did not contribute to this incident (Weather source: NOAA - Washington DC).

Related Rules and Procedures

SOP #14 – Bomb Threat/Suspicious Package/Unattended Package

Human Factors

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

Post-Incident Toxicology Testing

Post-Incident Toxicology Testing was not conducted for this event.

Findings

- Train Operator was notified of a bomb threat via emergency intercom by a customer on rail car 7643.
- Train Operator inspected the rail car where the threat was reported, advised ROCC that nothing was found, and made radio transmissions utilizing their handheld radio.
- MTPD EOD swept the train and found no evidence of suspicious packages or hazardous materials.

Immediate Mitigation to Prevent Recurrence

- MTPD responded and inspected the suspicious package.
- Shaw-Howard University Station evacuated.
- Train service was suspended at Shaw-Howard University Station.

Probable Cause Statement

The probable cause of the Evacuation for Life Safety Reasons event on August 31, 2023, at Shaw-Howard University Station was due to a bomb threat onboard the train.

Recommended Corrective Actions

There are no Recommended Corrective Actions for this event. No major discrepancies were identified.

Appendices

Appendix A – Interview Summary

The below narrative summarizes the incident and represent the statements made by the involved individual. As such, times and details may conflict with the data contained in systems of record.

Incident Commander

At the event at Shaw-Howard Station, the Incident Commander established and staged Explosive Ordnance Disposal and K-9 response units. During the initial investigation, the Incident Commander learned of a person of interest and the possible whereabouts of said subject. The person of interest was located and questioned soon after by MTPD officers and was released. The search of the consist and the area yielded no suspicious items.

Appendix B – MTPD Event Report



Event Report			
Metro Transit Police Department		ORI-DCMTP0000	
Type of Report	MTPD CCN	Local Jurisdiction	Local CCR
Closed	2023-10460	District of Columbia	

Event Location					
Street	Station Acronym	City, State	County	MTP District	Local District
1701 8th St NW		WASHINGTON, DC 20001			
Date and Time of Event			Date and Time Reported		
From	To				
8/31/2023 12:59:00 PM		8/31/2023 1:03:31 PM			
Category					
Rail Station, Line or Right-of-Way		On Bus		Property	Other
Specific Location (Foot Bridge, Kiosk, Platform, Train, Etc.)			For Burglary or B&E Only		
			If Hotel Rule Applies, #Premises or Facilities Entered:		
Location Description					

Event Information			
If Incident Use This Block	Offense #		
Accident Classification	Offense Classification		
Incident Description	Description		
	Weapons/Force Type of Activity		
Entry Type:		Number Premises Entered:	
State Crime Motivation:			
Bias Motivation:			
Offender Suspected of Using:		Molotov Cocktail (MC):	
Case Status Information		If Case Cleared Exceptionally:	Clearance Date:
Case Status (Completed by the official who signs this report):			
Reporting Officer (Print)	Badge #	Second Officer (Print)	Badge #
[Redacted]			
Supervisor's Name (Electronically Appointed)		Teletype #	Investigator Notified #

MTPD CCN:
ORI-DCMTP0000

Event Report Page 1 of 5

Document 1 – MTPD Event Report, Page 1 of 5

Incident Date: 08/31/2023 Time: 12:58 hours
Final Report – Evacuation for Life Safety Reasons
E23604

Drafted By: SAFE 711 – 10/23/2023
Reviewed By: SAFE 707 – 10/24/2023
Approved By: SAFE 71 – 10/30/2023

Victim Information				
Victim Sequence #:		Victim Assistance Provided:		
Last Name, First MI				DOB
Address Type	Address (Street) City, State Zip			
Type Phone	Phone Number			
Work/School Address - Add. Contact Info				
Email				
Age of Victim	Sex	Race	Ethnicity	Resident Status
Classification of Victim	Type of Victim	This Victim is Related to Which Offense		
Is suspect information available at the time of this report:				
Relationship:				
Injury Type	Responding Ambulance:		Taken Where	
Aggravated Assault/Homicide Information				
Aggravated Assault/Homicide Circumstances			Additional Justifiable Homicide Circumstances	

MTPD-CCN:
ORI-DCMTF0000

Event Report Page 2 of 5

Document 2 - MTPD Event Report, Page 2 of 5

Incident Date: 08/31/2023 Time: 12:58 hours
Final Report – Evacuation for Life Safety Reasons
E23604

Drafted By: SAFE 711 – 10/23/2023
Reviewed By: SAFE 707 – 10/24/2023
Approved By: SAFE 71 – 10/30/2023

Page 13

Has a DVR been requested?	
<i>Narrative Information</i>	
At MVSQ R/P asked two individuals if they had bombs in their bags. They said yes. All parties boarded train 502. R/P reported it and the train was held at SHAW. K26 sweep of the station and train was negative. R/P 29 was negative. R/P was released.	
<small>If second CCN is available, insert here:</small>	<small>Additional Narrative on Supplemental Report</small>

MTPD CCN:
ORI-DCMTP0000

Event Report Page 3 of 5

Document 3 - MTPD Event Report, Page 3 of 5

Incident Date: 08/31/2023 Time: 12:58 hours
Final Report – Evacuation for Life Safety Reasons
E23604

Drafted By: SAFE 711 – 10/23/2023
Reviewed By: SAFE 707 – 10/24/2023
Approved By: SAFE 71 – 10/30/2023

Additional Narrative

On 08312023 at approximately 1303 hours, I, 519 was dispatched to respond to SHAW for the report of a bomb threat on train 502, rail car 7642, which a subject pressed the emergency button on that rail car. I responded along with MTPD Officer [REDACTED] and [REDACTED]. While enroute Communications advised that the train was off loaded. Upon all listed units arrival, the station was being evacuated by rail personnel and MTPD units assisted. A preliminary sweep of the train was conducted by [REDACTED] with negative results. [REDACTED] advised that trains can single track around the incident and bypass the station until a proper sweep by a K-9 Officer is completed. MTPD Officer [REDACTED]/502 arrived and conducted a sweep of the train and station with negative results. The train was released and the station was reopened to normal service at 1325 hours. A lookout for the subject who placed the call was given for a female wearing all white with a white scarf around her face. A snippet was disseminated. Officer [REDACTED] and I conducted a canvass of the surrounding area and located a female (who will be referred to as R/P), matching the description of the individual in the snippet sitting on the second level of the Watha T Daniel-Shaw Library (located at 1630 Seventh Street NW, Washington, DC 20001). R/P was stopped and relocated to outside the library entrance for further investigation. R/P stated at Mount Vernon square station she approached two patrons (a male and a female) who were in possession of multiple suitcases and asked them where they were from. They replied Argentina. R/P asked them if there were bombs in their baggage which they replied yes. R/P then took a picture of them and sent it to MTPD Communications via text tip. R/P showed me the text tip which shows a blurry picture of two individuals in possession of approximately three rolling suitcases and a message stating "These individuals have bombs". A train serviced Mount Vernon square which R/P and the two individuals boarded. R/P then pushed the emergency button on rail car 7642 and stated to the Operator "it's people on this train with bombs". The train was held at SHAW for further investigation. R/P exited the station on the 8th and R St Side. By the picture R/P provided from text tip, [REDACTED] reports observing them at SHAW when the station was being evacuated. [REDACTED] advised the two subjects didn't respond to any announcements for evacuation. [REDACTED] approached them and it appeared there was a language barrier therefore he had to give further assistance for them to leave. A NCIC/WALES check of R/P was negative. MTPD Detective [REDACTED] and [REDACTED] responded and interviewed R/P. They were given the same story with an addition of what made her question the two individuals. R/P stated that she was physic and had a cane that contains a magnet that drew her to the luggage. After further investigation it was determined that R/P did not commit any criminal offense. R/P was given an explanation and released.

TSOC was notified at 1440 hours
TSA 08-29401-23 Kent

Other WMATA Personnel on scene:

MTPD [REDACTED], MTPD [REDACTED], MTPD [REDACTED], MTPD [REDACTED], MTPD [REDACTED],
MTPD [REDACTED], MTPD [REDACTED], Rail Supervisor [REDACTED]

MTPD CCN:
081-DCMTP0000

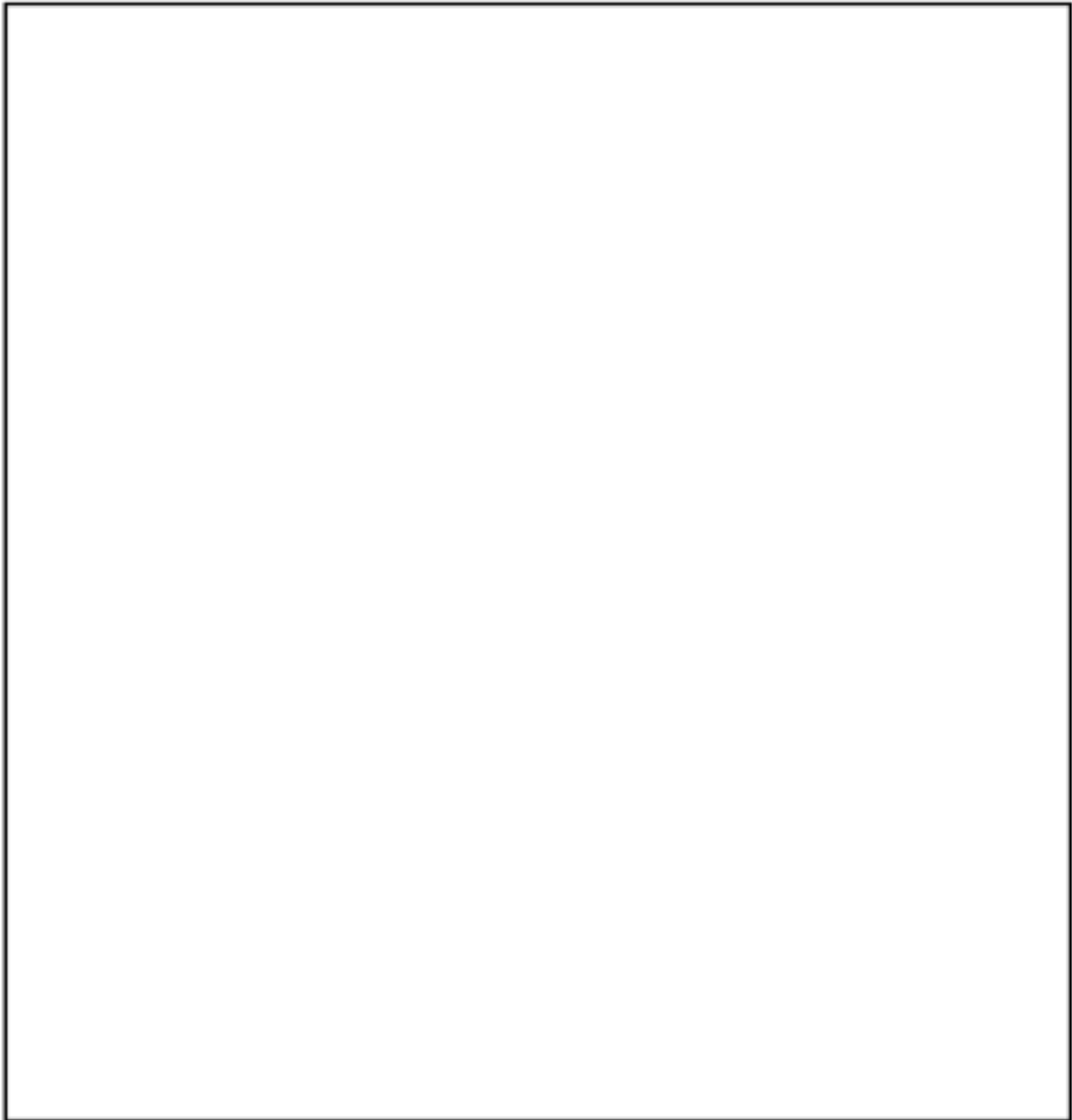
Event Report Page 4 of 5

Document 4 - MTPD Event Report, Page 4 of 5

Incident Date: 08/31/2023 Time: 12:58 hours
Final Report – Evacuation for Life Safety Reasons
E23604

Drafted By: SAFE 711 – 10/23/2023
Reviewed By: SAFE 707 – 10/24/2023
Approved By: SAFE 71 – 10/30/2023

Page 15



MTPD CCN:
ORI-DCMTR0000

Event Report Page 6 of 6

Document 5 - MTPD Event Report, Page 5 of 5

Incident Date: 08/31/2023 Time: 12:58 hours
Final Report – Evacuation for Life Safety Reasons
E23604

Drafted By: SAFE 711 – 10/23/2023
Reviewed By: SAFE 707 – 10/24/2023
Approved By: SAFE 71 – 10/30/2023

Page 16

Appendix C – ROCS SPOTS Report

ROCS SPOTS REPORT

based on up-to-the-second operational performance data from the Rail Operations Control System

ID	Platform	length	dcode	Right door open	Right door close	dwell	Left door open	Left door close	dwell	Head Arrived	Tail cleared	Travel Time door open to door open
502	E01-2	2	43				12:01:09	12:01:23	14	12:00:34	12:01:52	-
502	F01-2	2	43				12:03:00	12:03:17	17	12:02:23	12:03:42	1:51
502	F02-2	2	43				12:04:29	12:04:47	18	12:03:53	12:05:12	1:29
502	F03-2	2	43	12:06:19	12:06:40	21				12:05:43	12:07:00	1:50
502	F04-2	2	43				12:08:27	12:08:44	17	12:07:52	12:09:07	2:08
502	F05-2	2	43				12:10:15	12:10:30	15	12:09:36	12:11:04	1:48
502	F06-2	2	43				12:12:50	12:13:05	15	12:12:14	12:13:29	2:35
502	F07-2	2	43				12:15:20	12:15:35	15	12:14:42	12:15:57	2:30
502	F08-2	2	43				12:17:45	12:17:59	14	12:17:08	12:18:25	2:25
502	F09-2	2	43				12:20:14	12:20:27	13	12:19:38	12:20:52	2:29
502	F10-2	2	43				12:22:59	12:23:14	15	12:22:22	12:23:37	2:45
502	F11-1	2	41	12:26:41	12:26:49	8	12:30:23	12:32:05	102	12:25:54	12:32:24	3:42
502	F10-1	8	41				12:35:07	12:35:22	15	12:34:31	12:35:45	8:26
502	F09-1	8	41				12:37:54	12:38:08	14	12:37:19	12:38:34	2:47
502	F08-1	8	41				12:40:16	12:40:31	15	12:39:41	12:40:54	2:22
502	F07-1	8	41				12:42:35	12:42:50	15	12:42:01	12:43:14	2:19
502	F06-1	8	41				12:44:59	12:45:16	17	12:44:27	12:45:38	2:24
502	F05-1	8	41				12:47:27	12:47:42	15	12:46:55	12:48:06	2:28
502	F04-1	8	41				12:49:18	12:49:34	16	12:48:40	12:49:57	1:51
502	F03-1	8	41	12:51:22	12:51:41	19				12:50:52	12:52:02	2:04
502	F02-1	8	41				12:53:02	12:53:19	17	12:52:26	12:53:43	1:40
502	F01-1	8	41				12:54:31	12:54:50	19	12:53:51	12:55:14	1:29
502	E01-1	8	41				12:57:19	12:57:35	16	12:56:33	12:58:00	2:48
502	E06-2	6	43				13:41:10	13:42:55	105	13:40:41	13:43:20	43:51
502	E05-2	6	43				13:45:14	13:45:33	19	13:44:46	13:45:57	4:04
502	E04-2	6	43				13:47:35	13:47:58	23	13:46:58	13:48:23	2:21
502	E03-2	6	43				13:49:58	13:50:18	20	13:49:29	13:50:45	2:23
502	E02-2	6	43				13:51:45	13:51:58	13	13:51:13	13:52:22	1:47
502	E01-2	6	43							13:52:45	13:54:07	-
502	F01-2	6	43							13:54:47	13:56:14	-
502	F02-2	6	43				13:57:02	13:57:18	16	13:56:29	13:57:44	5:17
502	F03-2	6	43							13:58:11	13:59:29	-

Appendix E – Why-Tree Analysis

