



## **WMSC Commissioner Brief: W-0106 – Improper Movement – Foggy Bottom Station – May 21, 2021**

*Prepared for Washington Metrorail Safety Commission meeting on September 21, 2021*

### **Safety event summary:**

During a service disruption on the Blue, Orange and Silver Lines, the Rail Operations Control Center (ROCC) instructed a Train Operator of an inbound train to offload a train at Foggy Bottom, clear the interlocking, then go back into service at Foggy Bottom Station back toward Vienna Station. The Train Operator offloaded the train, but then reversed ends and operated the train without speed commands outbound back toward Vienna Station on the same inbound track. This meant the train moved directly toward another train that was servicing Rosslyn Station.

The controller had intended for the Train Operator to continue inbound after offloading the train to clear the interlocking between Foggy Bottom and Farragut West stations, then reverse ends and cross over from Track 1 to Track 2 to service Foggy Bottom Station on Track 2 outbound toward Vienna.

The communication between the Train Operator and ROCC Controller was not specific, and the Train Operator was not familiar with the territory to know that there was no interlocking between Rosslyn and Foggy Bottom stations. Additionally, communications between the Train Operator and ROCC Controller were interrupted by Automatic Train Control Maintenance (ATCM) communications on the same channel. Those communications were related to the efforts to address the switch issue at the D&G Junction east of Stadium-Armory Station that caused the underlying service disruption.

The Train Operator moved the train without speed commands by entering stop and proceed mode. The train moved approximately 840 feet before the Train Operator stopped the train after being contacted by the ROCC Controller.

Metrorail allowed the Train Operator to reverse ends again to travel eastbound, operating in service toward New Carrollton. The train had speed commands, and the Train Operator was instructed to go into service at Farragut West. The Train Operator was removed from service at Cheverly Station by the nearest available supervisor. The ROCC controller was also removed from service for post-event testing.

The Train Operator had approximately six months of experience, and had only performed a move like this once since certifying as a train operator. This type of movement and location familiarization for such movement is not covered in detail in Metrorail field training practices.

### **Probable Cause:**

The probable cause of this event was that Metrorail does not require or provide complete training to all train operators on line familiarization, on changing ends at interlockings or on associated crossover moves, does not provide supervisory oversight or coaching to ensure operators have necessary knowledge and experience, and does not consistently follow radio communications protocols.

### **Corrective Actions:**

Metrorail is working on Switch 11A in the D&G Junction.

Metrorail is evaluating line platform instructor and line familiarization training improvements.



The Train Operator and ROCC Controller received refresher training,

**WMSC staff observations:**

On August 22, Metrorail split the Blue, Orange and Silver Line territory that had been governed by the OPS 2 desk in the ROCC to create a long-planned OPS 4 desk that now governs movement from Clarendon to points west on the Orange and Silver Lines. This should help somewhat reduce the workload on OPS 2 controllers in future similar events, and somewhat reduce radio traffic on the OPS 2 channel in future similar events.

Metrorail has an open CAP related to radio communication. Although there has been significant improvement over the last several years, it is imperative that Metrorail continue to improve radio discipline even after that CAP is closed. Metrorail could also improve communication through more standardized language and terminology.

This event is one of several that the WMSC has observed that suggest there may be insufficient initial and recurring physical characteristics training and knowledge requirements for at least some Metrorail personnel to properly understand and identify critical elements of territory that they work on or may work on. In this case, the Train Operator appears to have had an overreliance on ROCC controllers with an expectation that the controller would provide them with all necessary knowledge of the territory even while the controller was extremely busy handling a service disruption. In an interview, the controller suggested it would be beneficial to know when train operators are not experienced with certain operations. Metrorail is generally only providing some limited line familiarization training when operators switch divisions. The WMSC is further assessing the physical characteristics training and knowledge issue through ongoing inspection and audit work. The WMSC has begun document reviews for a Rail Operations Audit. Interviews and site visits for that audit are scheduled to begin October 5, 2021.

The WMSC's Automatic Train Control (ATC) and Signaling Audit issued in May 2021 identified safety deficiencies related to Metrorail's switch maintenance and related practices. These deficiencies are required to be addressed through corrective action plans, The WMSC is still directing revisions to some of Metrorail's proposed CAPs. This investigation identified that the point on Switch 11A, a Grand Master (GM) 4000 switch, had been replaced with a part not made by the original equipment manufacturer that requires additional maintenance through surveys and adjustments to maintain a state of good repair. In addition, as noted in the ATC Audit, the WMSC identified issues related to the GM 4000 switches. In late August, Metrorail identified specific systemic problems with the point detector on these switches that require increased inspections and other mitigations until longer-term repairs are made.

A ROCC Superintendent saw this improper movement – without speed commands and against the normal flow of traffic – and helped to ensure that the controller contacted the train to get the operator to stop before getting even closer to a head-on collision with the train on the platform at Rosslyn Station. While this is positive, the Train Operator was allowed to reverse ends and continue in service all the way to Cheverly Station before being removed from service as required by Metrorail policy.

Metrorail did not effectively communicate during this event within the ROCC to ensure that the Incident Management Official (IMO) that the Safety Department has designated as responsible for reporting safety events from within the ROCC was aware. The ROCC notified SAFE via phone of this incident at 7:55 p.m. Metrorail has not defined the IMO's role and responsibilities, yet IMOs have been carrying out a variety of tasks such as being directly involved as a Metro Transit Police Department liaison during service disruptions and other emergencies. The WMSC is further assessing



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Metrorail's emergency management and fire-life safety programs through an audit that included site visits and interviews conducted in August 2021. The WMSC is currently finalizing a draft report, which is expected to be completed in October.

**Staff recommendation:** Adopt final report.



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

**FINAL REPORT OF INVESTIGATION A&I E21204**

<b>Date of Event:</b>	May 21, 2021
<b>Type of Event:</b>	O-7 Improper movement of any rail vehicle on the mainline or in a yard, including over improperly aligned switch(es).
<b>Incident Time:</b>	18:52 hours
<b>Location:</b>	Foggy Bottom Station, Track #1
<b>Time and How received by SAFE:</b>	19:55 hours, SAFE Phone
<b>WMSC Notification Time:</b>	20:50 hours
<b>Responding Safety Officers:</b>	N/A
<b>Rail Vehicle:</b>	L7234x7235-7227x26-7094x7095-7181x7180T
<b>Injuries:</b>	None
<b>Damage:</b>	None
<b>Emergency Responders:</b>	Office of Rail Transportation (RTRA)
<b>SMS I/A Number</b>	20210521#93434

Foggy Bottom – Improper movement

May 21, 2020

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## Abbreviations and Acronyms

<b>AIMS</b>	Advanced Information Management System
<b>ARS</b>	Audio Recording System
<b>CMOR</b>	Office of Chief Mechanical Officer
<b>ER</b>	Event Recorder
<b>ETO</b>	Exclusive Track Occupancy
<b>FT</b>	Foul Time
<b>IIT</b>	Incident Investigation Team
<b>LPI</b>	Line Platform Instructor
<b>MC</b>	Master Controller
<b>MSRPH</b>	Metro Safety Rules Procedures Handbook
<b>NVR</b>	Network Video Recorder
<b>ROCC</b>	Rail Operations Control Center
<b>ROQT</b>	Rail Operations Quality Training
<b>RTC</b>	Rail Traffic Controller
<b>RTRA</b>	Office of Rail Transportation
<b>SOP</b>	Standard Operating Procedure
<b>VMDS</b>	Vehicle Monitoring and Diagnostic System
<b>WMSC</b>	Washington Metrorail Safety Commission

## **Executive Summary**

On Friday, May 21, 2021, at 1852 hours. The Rail Operations Control Center (ROCC) received an Advanced Information Management System (AIMS) indication Train ID 907 [(L) 7234x7235-7227x26-7094x7095-7181x7180 (T)] Train Operator moved without speed commands against the normal flow of traffic on Track #1 in Vienna Station's direction. Based on the AIMS playback, Train ID 611 Train Operator was stationary servicing Rosslyn Station on Track #1 while Train ID 907 Train Operator operated in the wrong direction towards Rosslyn from Foggy Bottom Station.

The D&G junction experienced a switch out of correspondence at 1749 hours, which caused delays on the orange, blue, and silver lines. ROCC was turning trains back at strategic locations to minimize customer impacts and subsequently instructed Train Operator of Train ID 907 to go out of service at Foggy Bottom Station.

The ROCC notified SAFE via phone of this incident at 1955 hours. The ROCC said the Radio RTC instructed Train ID 907 Train Operator to offload at Foggy Bottom Track #1, clear the interlocking at Foggy Bottom Station, and go back in service at Foggy Bottom track two in Vienna Station's direction.

Based on Network Video Recorder (NVR) playback Train ID 907 Train Operator offloaded their customers, performed a walk-through of their train, and keyed up car 7180 on the Rosslyn end. Train ID 907 Train Operator entered stop and proceed method and moved their consist towards Rosslyn on Track #1. The Office of Chief Mechanical (CMOR) Incident Investigation Team (IIT) downloaded the Vehicle Monitoring and Diagnostic System (VMDS) data. CMOR determined the following: Train ID 907 Train Operator keyed up Trailing Car 7180, activated stop and proceed mode, and traveled 843.2 feet before coming to a complete stop outside Foggy Bottom Station platform limits Track #1. Audio Recording System (ARS) playback confirmed the Radio RTC instructed Train ID 907 as follows:

*“Train 907 Foggy Bottom track #1; I need you to make good announcements to your customers. You are going to offload clearing the interlocking going back into service in the direction of Vienna.”*

Train ID 907 Train Operator responds to the Radio RTC; however, some audio was not clearly understood due to ATCM stepping on the Train Operator's repeat back while requesting ROCC place switch 11A/B the normal position. SAFE captured the following transmission during the review.

*“Going back in the direction of Vienna over.”*

The Radio RTC did not respond to the Train Operator. The Radio RTC managed a switch out of correspondence at the D&G. At 18:47 hours, the Radio RTC contacted Train ID 907 to ascertain if Train ID 907 copied their transmission. Train ID 907 Train Operator stated:

*“That’s affirm I have offloaded my train, heading towards my trailing end.”*

The Radio RTC responded and stated, *“Affirm Centrals out 907.”*

The Radio RTC did not correct Train ID 907 Train Operator and instructed them to return to their lead car. The Radio RTC and Train Operator did not use 100 percent repeat back during this incident. A further review determined that the Radio RTC never gave the Train ID 907 Train Operator full instructions, specifically not stating that Train ID 907 would cross over from track 1 to 2 after clearing the interlocking. After Train ID 907 Train Operator stated they were heading to their trailing car, the Radio RTC said:

*“You are going to clear the interlocking at Foggy Bottom. You are going back into service at Vienna over.”*

Train ID 907 Train Operator confirmed the Radio RTC instructions, but the Train Operator was already seated and keyed up on trailing car 7180 at the time of this transmission. At 18:52 hours, the Radio RTC instructs Train ID 907 to stop their train and requested which end they were on. Train ID 907 Train Operator stated I am on the trailing end. The Radio RTC said:

*“I need you to reverse ends; you are clearing the Foggy Bottom interlocking towards New Carrollton over.”*

*Train ID 907 Train Operator stated, “Affirm my apologies, clear the interlocking at Foggy Bottom.”*

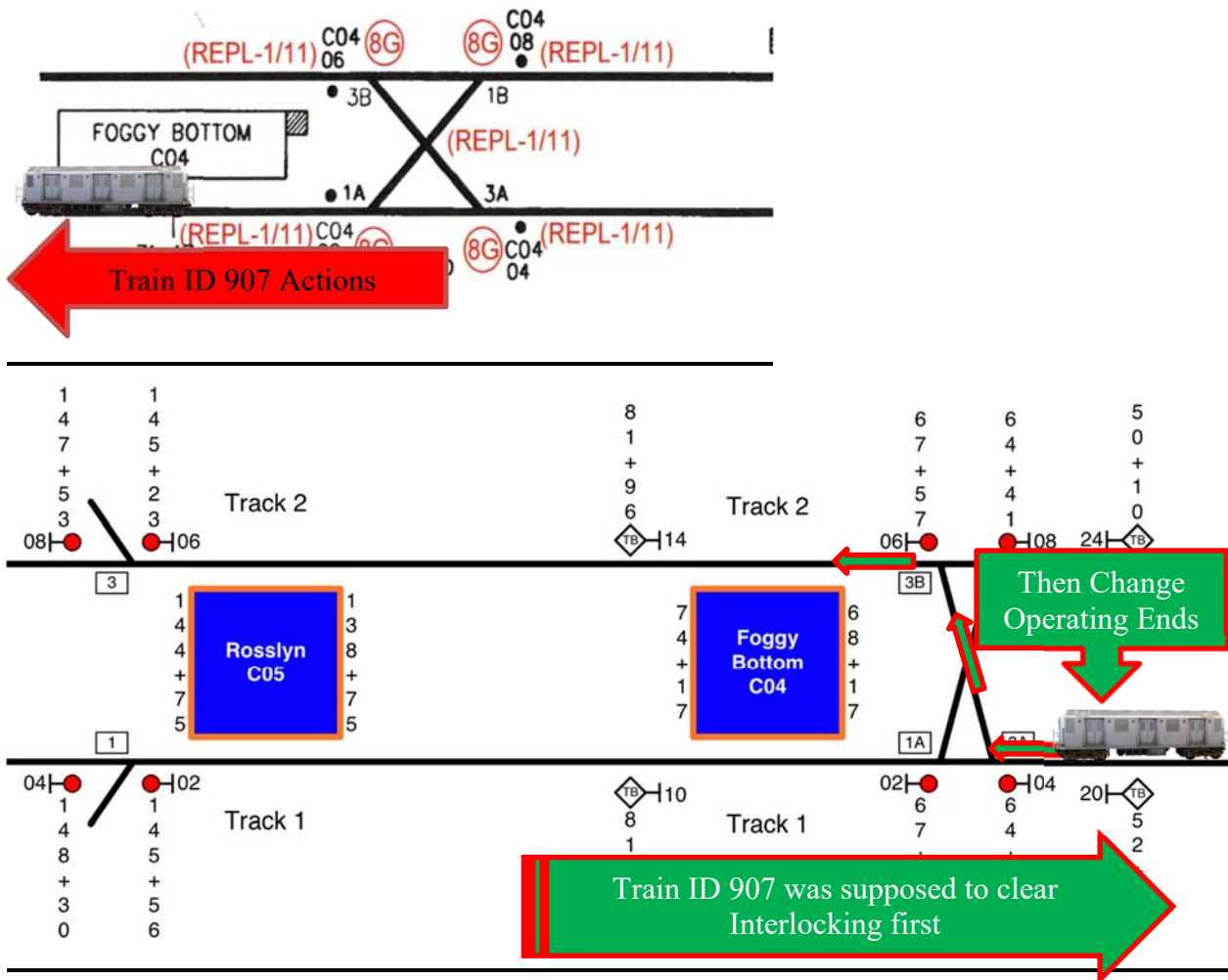
WMATA’s Drug and Alcohol Program determined that the Train Operator and Radio RTC did not violate the Drug and Alcohol Policy and Testing Program 7.7.3/6. No injuries or damage were reported.

### **Incident Site**

Foggy Bottom Track #1

### **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 an Improper Rail Vehicle Movement notification at Foggy Bottom Station on May 21, 2021, SAFE launched a cross-functional 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

- Formal Interviews – SAFE interviewed two individuals as part of this investigation. Interviews included persons present at, during, and after the incident, those directly involved in the response process, and Managers responsible for the procedure. SAFE interviewed the following individuals:
  - Train Operator
  - Radio RTC
- 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:
  - Employee Training Procedures & Records
  - Metro Safety Rules and Procedures handbook (MSRPH)
  - National Oceanic and Atmospheric Administration (NOAA) data
  - Certifications
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
  - Audio Recording System (ARS) playback include OPS 2 Radio
  - Network Video Recorder (NVR)

## **Investigation**

On May 21, 2021, Train ID Train Operator entered Foggy Bottom Station platform limits on Track #1. The Radio RTC contacted Train ID 907 Train Operator and stated, *“Train 907 Foggy Bottom track #1, I need you to make good announcements to your customers. You are going to offload clearing the interlocking going back into service in the direction of Vienna.”* “

Train ID 907 Train Operator responds to the Radio RTC; however, some audio was not clearly understood due to ATCM stepping on the Train Operator’s repeat back while requesting ROCC place switch 11A/B the normal position at the D&G junction. SAFE captured the following transmission during the ARS review.

*“Going back in the direction of Vienna over.”* The Radio RTC did not respond to the Train Operator. The Radio RTC managed 11A switch out of correspondence at the D&G. At 18:47 hours, the Radio RTC contacted Train ID 907 to ascertain if Train ID 907 copied their transmission. Train ID 907 Train Operator stated: *“That is affirm I have offloaded my train, heading towards my trailing end.”* The Radio RTC responded and said, *“Affirm Centrals out 907.”*

Based on NVR playback, Train ID 907 Train Operator offloaded their customers, performed a walk-through of their train, and keyed up car 7180 on the Rosslyn end.

ARS playback review confirmed the Radio RTC did not instruct the Train Operator to go back to their lead car. The Radio RTC and Train Operator did not use 100 percent repeat back during this

incident. A further review determined, the Radio RTC never gave full instructions to Train ID 907 Train Operator. The Radio RTC never mentioned Train ID 907 would cross over from track 1 to 2 after clearing the interlocking. After Train ID 907 Train Operator stated they were heading to their trailing car, the Radio RTC said:

*“You are going to clear the interlocking at Foggy Bottom. You are going back into service at Vienna over.”*

Train ID 907 Train Operator confirmed the Radio RTC instructions, but the Train Operator was already seated and keyed up on trailing car 7180 at the time of this transmission. Train ID Train Operator is then observed attempting to take a point of power; however, the train did not move. Train ID 907 did not have speed commands.



*Train ID Train Operator in the trailing cab attempting to move the train; however, the Train Operator had no speed readouts.*

Train ID 907 Train Operator entered stop and proceed method without contacting ROCC and moved their consist towards Rosslyn on track #1.



*At approximately 1857 hours, Train ID 907 Train Operator enters stop and proceed mode.*

The CMOR IIT downloaded the Vehicle VMDS data and determined the following: Train ID 907 Train Operator keyed up Trailing Car 7180, activated stop and proceed mode, and traveled 843.2 feet before coming to a complete stop outside Foggy Bottom Station platform limits Track #1.



*Train ID 907 Train Operator begins to move. Use the blue ETS station to the right as a marker. ETS boxes are located every 800 feet.*



*Train ID 907 Train Operator reached the second ETS box approximately 800 feet after moving in Rosslyn Station's direction.*



*Train ID 907 Train Operator comes to a complete stop 837.2 feet later and communicates with the ROCC Radio RTC.*

At 18:52 hours, the Radio RTC instructs Train ID 907 to stop their train and requested which end they were on. Train ID 907 Train Operator stated that they were on the trailing end.



*Train ID 907 Train Operator comes to a complete stop 837.2 feet later and communicates with the ROCC Radio RTC.*

The Radio RTC stated: *“Need you to reverse ends, you are clearing the Foggy Bottom interlocking towards New Carrollton over.”* Train ID 907 Train Operator said, *“Affirm my apologies, clear the interlocking at Foggy Bottom.”*



*Train ID 907 Train Operator keyed down Car 7180, heading in Rosslyn Station’s direction. Left Chain Marker reflection is no longer visible.*

Train ID 907 proceeded towards New Carrollton modified from the original instructions to cross over from track two to track one after clearing Foggy Bottom interlocking.

ROCC subsequently removed the Radio RTC. RTRA removed the Train Operator from service at Cheverly Station for post-incident toxicology testing. No injuries or damage were reported. ROCC removed the incident consist from revenue service for post-incident testing.

### Chronological ARS Timeline

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

<b>Time</b>	<b>Description</b>
18:43:37 hrs.	Lead Car 7234 Came to a complete stop at Foggy Bottom Station, Track #1 [VMDS]
18:43:46 hrs.	Left Open Door Pushbutton Depressed. [VMDS]
18:45:42 hrs.	<p><u>Radio RTC:</u> Train 907 Foggy Bottom track #1 I need you to make good announcements to your customers you are going to offload, clearing the interlocking going back into service in the direction of Vienna.</p> <p><u>Train ID 907 Train Operator:</u> "Going back in the direction of Vienna over."            **Note: ATCM stepped on the train operator repeat back while requesting ROCC to place switch 11A/B in normal the normal position. The Radio RTC did not respond to the Train Operator. The Radio RTC was managing a switch out of correspondence at the D &amp; G. [OPS 2 Radio]</p>
18:46:33 hrs.	Left Close Door Pushbutton Depressed [VMDS]
18:46:38 hrs.	All doors Closed and Lock Signal activates [VMDS]
18:46:33 hrs.	The Radio RTC made a blanket announcement on OPS 2, notifying Train Operators of an emergency on the roadway to make good announcements to your customers. They currently had personnel requesting access to the roadway. Stand by, stand clear. [OPS 2 Radio]
18:47:24 hrs.	Car 7234 Keyed Down [VMDS]
18:47:30 hrs.	<p><u>Radio RTC:</u> 907 Foggy Bottom one, did you copy offload your train over</p> <p><u>Train ID 907 Train Operator:</u> That is affirm I have offloaded my train head towards my trailing end.</p> <p><u>Radio RTC:</u> Affirm Centrals out 907 [OPS 2 Radio]</p>
18:47:48 hrs.	<p><u>Radio RTC:</u> 611 service and hold at Rosslyn</p> <p><u>Train ID 611:</u> 611 hold here at Rosslyn</p> <p><u>Radio RTC:</u> Affirm 611 central's out</p>

Time	Description
	*Note: The Radio RTC managed a D0-04 dark aspect at Eastern Market Track #2 with Train 607 [OPS 2 Radio]
18:50:13 hrs.	Trailing Car 7180, keyed up track #1, facing in the direction of Vienna [VMDS] Supported by Appendix B
18:50:29 hrs.	<u>Radio RTC:</u> 907 is your train clear of customers at this time over  <u>Train Operator:</u> That is affirmative, walked through, and verify the train is clear of customers over. [OPS 2 Radio]
18:50:53 hrs.	<u>Radio RTC:</u> "907, you are going to clear the interlocking at Foggy Bottom; you are going back into service at Vienna over." [OPS 2 Radio]
18:51:02 hrs.	<u>Train ID 907 Train Operator:</u> "Affirm, clear the interlocking at Foggy Bottom going back into service towards Vienna."  <u>Radio RTC:</u> "Thank you 907 Central's out" [OPS 2 Radio]
18:51:27 hrs.	The train entered Stop and Proceed Mode, ATP Speed limit 0 MPH. [VMDS]
18:51:28 hrs.	MC placed in a P1-P4 Power Mode, in the direction of Vienna, while in Stop and Proceed Mode [OPS 2 Radio]
18:51:30 hrs.	Train Begins to move towards Vienna [VMDS]
18:52:20 hrs.	The train comes to a complete stop after traveling 843.2 feet [VMDS]
18:52:21 hrs.	<u>Radio RTC:</u> "907 stop your train over" [repeated three times].  <u>Train ID 907 Train Operator:</u> "That's affirm train is stopped" [OPS 2 Radio]
18:52:29 hrs.	<u>Radio RTC:</u> "907, which end are you on?" [OPS 2 Radio]
18:52:32 hrs.	<u>Train ID 907 Train Operator:</u> "I am on my trailing end over" [OPS 2 Radio]  **Note: This is the wrong direction heading against traffic towards Rosslyn
18:52:38 hrs.	<u>Radio RTC:</u> "Need you to reverse ends you are clearing the Foggy Bottom interlocking towards New Carrollton over."  <u>Train ID 907 Train Operator:</u> "Affirm my apologies clear the interlocking at Foggy Bottom, over." [OPS 2 Radio]
18:55:10 hrs.	<u>Train ID 907 Train Operator:</u> "907 back in my lead car about to clear the interlocking at Foggy bottom" [OPS 2 Radio]



Time	Description
18:55:26 hrs.	<u>Radio RTC</u> : "You ready to clear the interlocking at Foggy Bottom." [OPS 2 Radio]
18:55:29 hrs.	<u>Train ID 907 Train Operator</u> : "Affirm clear the interlocking at Foggy Bottom." <u>Radio RTC</u> : "907, you are going to continue into service towards New Carrollton for me." [OPS 2 Radio]
18:55:45 hrs.	<u>Train ID 907 Train Operator</u> : "You said to continue on 907?" <u>Radio RTC</u> : "907 It is back in service in the direction of New Carrollton." <u>Train ID 907 Train Operator</u> : "That is affirm back in service in the direction of New Carrollton over." <u>Radio RTC</u> : "Affirm central's out." [OPS 2 Radio]
	Note: The Radio RTC contacted an RTRA Supervisor to remove Train ID 907 Train Operator from service. The Button RTC made immediate notification to the ROCC Assistant Superintendent.

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

### **Office of Chief Mechanical Officer (CMOR) Incident Investigation Team (IIT)**

#### Event Recorder (E/R) data and VMDS analysis

According to VMDS and ER data, Train ID 907 entered Foggy Bottom Station, Track #1. The doors were cycled, the train was keyed down and keyed back up on the opposite end towards Vienna. Stop and Proceed mode was activated with an ATP Speed limit of 0 MPH. The train proceeded to move 843 feet before coming to a complete stop and being keyed down. The train reversed direction again and headed towards Foggy Bottom Station.

There were no faults observed in the train's VMDS and ER logs that may have contributed to the cause of this incident.

See the timeline of events below:

Time	Description
18:43:30 hrs.	Lead Car 7234 Came to a complete stop at Foggy Bottom Station, Track #1
18:43:46 hrs.	Left Open Door Pushbutton Depressed
18:46:33 hrs.	Left Close Door Pushbutton Depressed
18:46:38 hrs.	All doors Closed and Lock Signal activates
18:47:24 hrs.	Car 7234 Keyed Down
18:50:13 hrs.	Trailing Car 7180, keyed up track #1, facing in the direction of Vienna,
18:51:27 hrs.	The train entered into Stop and Proceed Mode, ATP Speed limit 0 MPH.

Time	Description
18:51:28 hrs.	MC placed in a P1-P4 Power Mode, in the direction of Vienna, while in Stop and Proceed Mode
18:51:30 hrs.	Train Begins to move towards Vienna
18:52:20 hrs.	The train comes to a complete stop after traveling 843.2 ft.
18:52:46 hrs.	Car 7180 Keyed Down
18:55:28 hrs.	Car 7234 Keyed Up in the Direction of Foggy Bottom
18:56:00 hrs.	MC placed in a P1-P4 Power Mode, in the direction of Foggy Bottom, ATP Speed Limit 50 MPH
18:56:01 hrs.	The train begins to move towards Foggy Bottom on Track #1.

**Recommendations:**

Perform Master Controller Checks on Car 7180.  
Successful Daily Inspection (DI)



## Advanced Information Management System (AIMS)



Diagram 1: Train ID 907 at Rosslyn Station



Diagram 2: Train ID 907 keyed up on the trailing end in Rosslyn Station's Direction

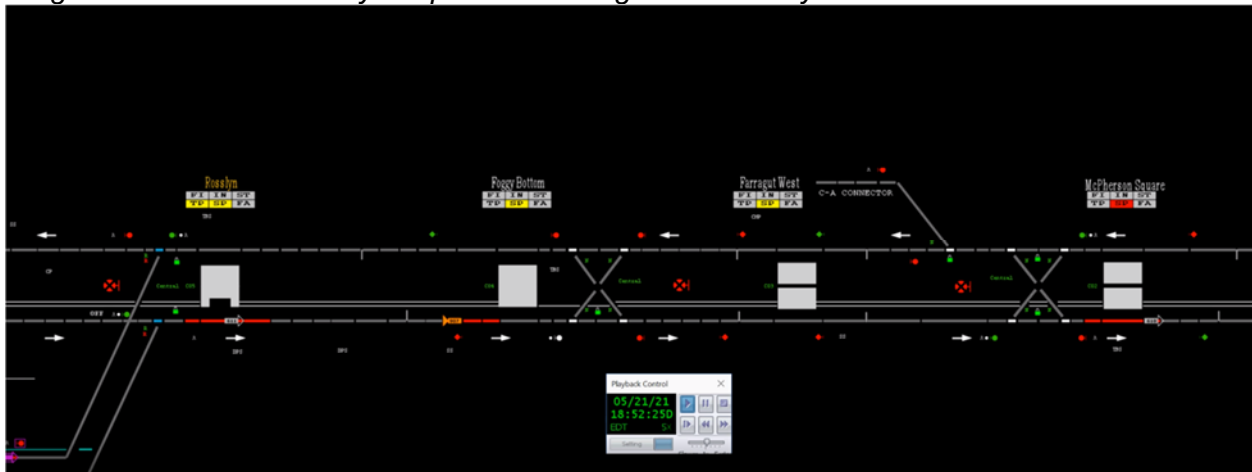


Diagram 3: Train ID 907 moved towards Rosslyn Station Track #1.

## **Office of Rail Transportation (RTRA)**

According to the RTRA managerial incident investigation, after reviewing the AIMS playback and ARS data, RTRA concluded the Train Operator moved their Train consist against the normal flow of traffic without speed commands, an absolute block, or ROCC permission. RTRA's root cause stated that the Train Operator failed to perform SOP, lacked communication, and did not fully understand the direction ROCC transmitted.

## **Office of Automatic Control Maintenance (ATCM)**

Based on the system of record data entered on May 21, 2021. ATCM personnel noted MOC reported Switch 11 in the D&G connector out of service in reverse. ATCM found Switch 11A point detector out of adjustment after ATCM adjusted the point detector and set a route through track 3 (Pocket track). The point detector loss adjustment due to vibration and switch mounting plate movement when train traversed switch 11A. ATCM adjusted the rod again and performed a point detector and obstruction test with 1/8, 1/4 obstruction gage. The maintenance ticket remains open for observation.

As of July 16, 2021, ATCM is still making the necessary maintenance adjustments to bring Switch 11A to a Good State of Repair.

## **The Office of System Maintenance (SMNT) Communication Section (COMM)**

COMM conducted a comprehensive Radio operational test between Rosslyn and Foggy Bottom Station on Tracks # 1 and 2. COMM reported no trouble found at this time; the radio system is functioning as designed.

## **Applicable Rules and Procedures**

### **Communication**

#### Train Operator and Radio RTC

*MSPRH Cardinal Rule 1.79 Personnel - Shall not take any action until they are positive that all radio transmissions or receptions are heard, fully understood, and acknowledged. Individual radio transmissions shall, at all times, be repeated by the receiver so the transmitter can confirm the message was received completely and by the intended receiver. Whenever the transmitter has completed their transmission and is turning the airtime over to the receiving party for acknowledgment or reply, they are to end their communication with the word "over." Speed restrictions must always be acknowledged by each Rail Vehicle Operator, even when a blanket message is sent out from Central Control, through 100 percent word for word repeat back from the Rail Vehicle Operators to Central Control or the Tower."*

## Train Operation

### Train Operator

#### *Operating Rule 3.79 Moving without speed commands*

### Training

Following a review of Rail Operations Quality Training (ROQT) Line Platform Instructor (LPI) records for incident Train Operator, SAFE did not identify any training issues. However, the LPI forms address operational functions (e.g., announcements, train berthing, and operational speed). SAFE did not observe any quality assurance checklist for crossover moves from one track to another via changing operating ends.

Additionally, SAFE reviewed and completed the Orange Line Familiarization training and assessment, which is only required when Train Operators switch divisions during a union pick or when an incident occurs. SAFE is recommending that ROQT undertake a review of the Line Familiarization course to identify opportunities for improvement.

Key focal areas:

- Interactive features to help Train Operators remain engaged.
- Voice features with interactive communication. For example, if ROCC tells you to verify that you have a lunar and if it's red, "click" to contact central.
- Conduct an evaluation of frequent incident locations on the respective lines based on resourced data and emphasize those points within the training.
- Incorporate one crossover move with changing ends in the opposite direction.

The Train Operator's training record reflected Red Line Familiarization on December 31, 2019, for a station overrun event in November of 2019.

### Interview Findings

Based on the investigation launched into the Foggy Bottom Improper Rail Vehicle Movement event, SAFE conducted two interviews via Microsoft Teams, including the investigation team and relevant Metro management. These interviews were conducted over three days after the event and identified the following key findings associated with this event, as follows:

The Train Operator involved The Train Operator did receive a copy of the Permanent Order T-20-28 and noted the proper procedures to move when a train loses speed commands. The Train Operator did not recall going into the stop and proceed mode; however, the Train Operator further noted they must have because you can't move the train unless you initiate the Stop and Proceed on a 7000 series. The Train Operator communicated with the Station Manager on the platform that their train was out of service while walking to their trailing cab.

The Train Operator has only performed one turnback at an interlocking since certifying as a Train Operator. The Train Operator thought the interlocking was on their trailing end. The Train Operator said their six months of experience is divided between yard operations and mainline. The Train Operator did not report any training issues.

The Train Operator stated there was no break in communication and that she was “just trying to hurry up and got the train out of the way.” The Train Operator felt rushed by the Radio RTC. They got nervous and anxious.

At the end of the interview, the Train Operator accepted the responsibility for their actions contributing to the event. However, the Train Operator noted to prevent a recurrence of an event, the RTC could provide clear instructions, such as “to clear their train for customers, head back to their lead car to clear the interlocking and reverse operating ends cross over from track #1 to track #2 towards Vienna.”

## RTC

Train ID 907 was on the platform at Foggy Bottom; I instructed Train ID 907 to offload the train, verify the train was clear of customers, and go back in service in the direction of Vienna. I went back to the emergency at D&G interlocking. I came back to the Train Operator and asked if their train was verified clear of customers at this time. The Train Operator responded that they were walking back to their trailing car. I said, okay, that’s fine and continued.

The Superintendent was on the floor and asked where is 907 going. I looked up at my screen and saw 907 moving and asked 907 to stop their train stop. The next thing I heard, I’m sorry, and the Train Operator stopped their train. I think the Train Operator reversed ends, and we removed the train operator from service Cheverly. The RTC instructed Train ID 907 to make announcements to your customers, verify your train is clear of customers, and clear the interlocking in the direction of Vienna.

The RTC stated they did not say “key down your train, verify your train is clear of customers, return to your lead car, then clear Foggy Bottom interlocking, reverse ends, verify correct alignment, cross over from Track 1 to Track 2 in the direction of Vienna.” The RTC noted that too much information might confuse an operator along with 100 percent repeat back. The RTC added that if they are seasoned Train Operators, they may feel that the ROCC is walking them through and may get complacent. The RTC attention was focused on giving ATCM ETO protection and radio communications. The RTC stated they did not see the train key on the wrong end of the AIMS screen. The RTC emphasized that they never gave Train ID 907 permission to move. The RTC stated it would be beneficial to know when new Train Operators performed operations never down before.

## Weather

On May 21, 2021, at the time of the incident, NOAA recorded the temperature as 84 ° F, with clear skies throughout the evening. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA) – Location: Washington, DC.)

## Human Factors

### Evidence of Fatigue

## RTC

Conditions were evaluated at the time of the incident to distinguish whether evidence of fatigue was present. The available data indicated no sign of fatigue. No video data was available of the

incident to review behaviors suggesting fatigue. The employee reported feeling fully alert at the time of the incident. The employee reported experiencing no symptoms of fatigue in the time leading up to the incident.

### Evidence of Fatigue

Train Operator

Conditions were evaluated at the time of the incident to distinguish whether evidence of fatigue was present. No signs or symptoms of fatigue were detected from the available data. Video of the incident was reviewed for signs of Train Operator's fatigue. No signs or symptoms of fatigue were evident from the video. The employee reported feeling fully alert at the time of the incident and experienced no symptoms of fatigue in the time leading up to the incident.

### Fatigue Risk

RTC

Data was evaluated for fatigue risk factors. Risk factors for fatigue were not present. The incident time of day did not suggest an increased risk of fatigue-related impairment. The employee reported some variation in the sleep schedule in the days leading up to the incident. The employee worked evenings in the days leading up to the incident. The employee was awake for 12.43 at the time of the incident. The employee reported 7.41 hours of sleep in the 24 hours preceding the incident. The off-duty period was 28 hours which provides an opportunity for 7-9 hours of sleep. This was -1-hour difference from the employee's usual workday sleep durations. The employee reported no issues with sleep.

### Fatigue Risk

Train Operator

Data was evaluated for fatigue risk factors. Risk factors for fatigue were not present. The incident time of day did not suggest an increased risk of fatigue-related impairment. The employee worked the evening shift in the days leading up to the incident. The employee was awake for 8.6 hours at the time of the incident. The employee reported 8 hours of sleep in the 24 hours preceding the incident. The off-duty period was 15.83 hours which provides an opportunity for 7-9 hours of sleep. This was a comparable amount of the employee's usual workday sleep durations. The employee reported no issues with sleep.

### Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined that the Train Operator and Radio RTC was not in violation of the Drug and Alcohol Policy and Testing Program 7.7.3/6.

### Findings

- The Radio RTC and Train Operator did not use 100 percent repeat back.
- The Radio RTC did not correct the Train Operator when they were headed towards their trailing car.
- The Radio RTC did not give complete instructions to Train ID 907.

- The Radio RTC focused attention on the D&G Switch failure and gave short instructions to the Train Operator at Foggy Bottom due to line delays and ETO protection for ATCM to mitigate the failure.
- The Train Operator entered stop and proceed mode without authorization.
- The Train Operator was unfamiliar with the physical characteristics of the mainline interlocking location.
- 11A/B Switch out of correspondence at the D&G Junction caused extensive delays resulting in train turnbacks.
- The Train Operator had less than six months of experience as an operator.
- The train traveled approximately 843.2 ft. against the normal flow of traffic towards Vienna.
- The LPI form does not reflect crossover moves with changing end operations.
- Orange Line Familiarization does not have interactive features to maintain retention of facts or attentiveness.

### **Immediate Mitigation to Prevent Recurrence**

- RTRA removed the Train Operator from service pending investigation and post-incident toxicology test results.
- ROCC removed the Radio RTC from service from pending investigation and post-incident toxicology test results.
- ROCC removed the incident consist from service for CMOR and CMNT post-incident investigative efforts.
- The ROCC is undergoing a reorganization that will incorporate more supervisory oversight. This action was in progress before this event.
- The ROCC is implementing a new ops channel to minimize the RTC's on the Orange, Blue, and Silver Lines workload. This action was in progress before this event.

### **Probable Cause Statement**

The initial probable cause of this event was switch 11A out of correspondence at the D&G junction causing extensive passenger and train delays on the Orange, Blue, and Silver lines cause ROCC to turn trains back at strategic locations to minimize customer delays. The Radio RTC gave a set of incomplete instructions to Train ID 907 Train Operator that were not fully repeated due to excessive radio traffic from ATCM personnel.

Before moving, the Radio RTC asked Train ID 907 Train Operator if they copied their transmission to offload their train, clear the interlocking, and operate towards Vienna Station. Train ID 907 Train Operator responded they were walking to their trailing end. The Radio RTC acknowledged this transmission but never corrected the Train Operator.

Further contributing to this event, Train ID 907 Train Operator entered a stop and proceed mode without permission from ROCC and moved their consist against the normal flow of traffic 832 feet in Rosslyn Station's direction on Track #1. The Train Operator was inexperienced and lacked familiarization with the interlocking's and rail line.

The inexperienced operator did not undergo line familiarization or conduct change end operations incorporating crossover moves at interlocking locations before certifying as an operator.



### **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.

<b>Corrective Action Code</b>	<b>Description</b>	<b>Responsible Party</b>	<b>Due Date</b>
93434_SAFECAPS_ RTRA_001	(RC-1, CF-2) Train Operator shall undergo Orange, Blue, and Silver Line familiarization, Virtual Refresher Training, incident interlocking simulation, moving without speed commands	RTRA SRC	Completed – July 16, 2021
93434_SAFECAPS_ ROCC_002	(CF-1) ROCC shall reinstruct RTC on the importance of General Rule 1.79 communication.	ROCC SRC	10/15/21
93434_SAFECAPS_ ATCM_003	(CF-3) ATCM shall ensure Switch 11A is returned to a Good state of Repair.	ATCM SRC	12/31/21
93434_SAFECAPS_ ROQT_004	(CF-2) ROQT shall evaluate LPI and Line Familiarization CBT to identify opportunities to improve interactive activities, including assessment testing enhancement.	ROQT SRC	12/31/21
93434_SAFECAPS_ ATCM_005	(CF-3) ATCM will evaluate the impacts and change control implications of changing out original parts with non-OEM parts, and will track in Maximo when non-OEM parts are used.	ATCM SRC	12/31/21

## Appendix A – Interview Summary

### Train Operator

WMATA employee with six months of experience as a Train Operator. The Train Operator has 5.5 years of seniority with authority; their previous role was a Bus Operator. The Train Operator's last certification was on October 2, 2020. The Train Operator had one previous incident for a Station Overrun on November 11, 2020.

The below narrative summarizes the interview with SAFE and represents the statements made by the involved individual. As such, times and details may present a conflict with the data contained in systems of record.

Upon arrival to WFC, "OPS 2 had something that happened in the D & G." When the Train Operator arrived at Rosslyn, the Radio RTC instructed them to hold with their doors open. The Radio RTC told the Train Operator to continue to Foggy Bottom Station and hold with their doors open. The Radio RTC then instructed the Train Operator to offload their train, verify clear of passengers, clear the interlocking going back towards Vienna. The Train Operator stated, on they were on their second block when they left Vienna."

The Train Operator cleared their train, walked through the train towards the cab area, and performed a radio check to let the Radio RTC know they were clear. The Radio RTC asked the Train Operator if they were clear; the Train Operator confirmed, went into the cab area, used their hand-held again because the train was rebooting. The Train Operator said to the Radio RTC, I am on my trailing end. The Radio RTC instructed the Train Operator to clear the interlocking and go back towards Vienna.

The Train Operator was on the trailing end and was told to clear the interlocking. The Train Operator said that they were unaware of where the interlocking was located. The Train Operator believed the interlocking was behind them at their trailing end. The Train Operator is used to the Radio RTC saying go back to your lead car if the interlocking is in the lead car area.

The Train Operator stayed on their trailing end and moved about 500-600 feet in the tunnel. The Radio RTC said stop, stop, stop. The Radio RTC asked which end I was on. The Train Operator told them their trailing end; the Radio RTC said no reverse ends and go back towards Foggy Bottom interlocking towards New Carrollton. The Train Operator noted that is when they realized they were operating on the wrong end. The Train Operator said my apologies reversed ends, and cleared the interlocking at Foggy Bottom. As the Train Operator reached the 8-car marker notified Radio RTC. The Radio RTC stated, 907 clear the interlocking at Foggy Bottom, then changed instructions to go back in service towards New Carrollton. An RTRA Supervisor removed the Train Operator from service for post-incident toxicology testing.

The Train Operator noted the proper procedures to move when a train loses speed commands. The Train Operator did receive a copy of the Permanent Order T-20-28. The Train Operator did not recall going into the stop and proceed mode; however, the Train Operator further noted they must have because you can't move the train unless you initiate the Stop and Proceed on a 7000 series. The Train Operator mentioned they communicated with the Station Manager on the platform that their train was out of service while walking to their trailing cab.

The Train Operator has only performed one turnback at an interlocking since certifying as a Train Operator. The Train Operator thought the interlocking was on their trailing end. The Train

Operator said their six months of experience is divided between yard operations and mainline. The Train Operator did not report any training issues.

The Train Operator stated there was no break in communication. I was just trying to hurry up and got the train out of the way. The Train Operator felt rushed by the Radio RTC. They got nervous and anxious.

At the end of the interview, the Train Operator accepted the responsibility for their actions contributing to the event. However, the Train Operator noted that if instructions were clearer from the Radio RTC to clear their train for customers, head back to their lead car, clear the interlocking and reverse operating ends crossing over from track #1 to track #2 towards Vienna would have been clear instructions

### Radio RTC

WMATA employee with 1.7 years of experience to include training as an RTC. The RTC has Air Traffic Controller industry experience with no previous roles held at WMATA. The RTC's last certification was on November 20, 2020.

The below narrative summarizes the interview with SAFE and represents the statements made by the involved individual. As such, times and details may present a conflict with the data contained in systems of record.

“A Train was coming out of New Carrollton yard that was going to Largo automatic signal trying to go in the pocket track saw a switch out of correspondence. ROCC dispatched supervisors out to the location to clamp the switches. During that time, ROCC began offloading trains turning back trains in strategic locations and expansive single-tracking trains through the area. Train ID 907 was on the platform at Foggy Bottom; I instructed Train ID 907 to offload the train, verify the train was clear of customers, and go back in service in the direction of Vienna. I went back to the emergency at D&G interlocking. I came back to the Train Operator and asked if their train was verified clear of customers at this time. The Train Operator responded that they were walking back to their trailing car. I said, okay, that’s fine and continued.”

The Superintendent was on the floor and asked where is 907 going. I looked up at my screen and saw 907 moving and asked 907 to stop their train stop. The next thing I heard, I’m sorry, and the Train Operator stopped their train. I think the Train Operator reversed ends, and we removed the train operator from service at Cheverly. I then went down for post-incident toxicology testing. The RTC stated the message I got from the Train Operator was that they were walking to their trailing car to verify the train was clear of customers.” The RTC instructed Train ID 907 to make announcements to your customers, verify your train is clear of customers, and clear the interlocking in the direction of Vienna.

The RTC stated they did not say key down your train, verify your train is clear of customers, return to your lead car. Then clear Foggy Bottom interlocking, reverse ends, verify correct alignment, cross over from Track 1 to Track 2 in the direction of Vienna. The RTC noted that too much information might confuse a person vs. 100 percent repeat back. The RTC added that if they are seasoned Train Operators, they may feel we are walking them through and may get complacent. The RTC said there were no distractions that may have contributed to the event within the ROCC. However, the RTC attention was focused on giving ATCM ETO protection and radio communications. The RTC stated they did not see the train key up on the wrong end via the AIMS screen. The RTC emphasized that they never gave Train ID 907 permission to move. The RTC

stated it would be beneficial to know when new Train Operators performed operations never done before. Normally, Train Operators would let you know they are new and never performed this function.

### Appendix B – Root Cause Analysis

