

WMSC Commissioner Brief: W-0093 - Unintended Movement - U Street Station - December 9, 2020

Prepared for Washington Metrorail Safety Commission meeting on August 3, 2021

Safety event summary:

A Train Operator who had been instructed by the Rail Operations Control Center (ROCC) to stop at U Street Station and reverse ends to move the train back toward Mt. Vernon Square Station instead continued toward Columbia Heights Station and into a single-tracking area without speed commands.

When Train 506 was stopped at Shaw-Howard U Station at 11:33 a.m., the ROCC instructed the operator to continue toward U Street Station under a permissive block, cross over from Track 1 to Track 2, then reverse ends to be in service toward Branch Ave. Station. The Train Operator acknowledged those instructions, but did not perform a 100 percent repeat-back. In an investigative interview, the operator stated required repeat backs were not possible due to heavy radio traffic. The limited acknowledgement that was provided suggests a lack of physical characteristics training, because the repeat back suggested that Mt. Vernon Square was further down the line in the direction the train was currently traveling. The ROCC controller acknowledged this improper repeat back as being proper: "Affirm, Central's out". In the investigative interview, the Train Operator stated it was possible they did not hear the initial transmission correctly.

At 11:35 a.m., Train 506 stopped at U Street Station and the doors opened. At 11:36 a.m., the doors closed and the train departed U Street Station toward Columbia Heights Station. Vehicle data show that the Train Operator had been in stop and proceed mode, with no speed commands, when Train 506 departed U Street Station. The Train Operator had entered stop and proceed mode prior to servicing the station. The mode essentially overrides zero speed commands and provides for the train to move up to 15 mph. This mode resets only when the train exceeds 15 mph or when speed commands return.

Trains were single-tracking at the time of this event due to Metro Transit Police Department (MTPD) response on the roadway and a member of the public on the roadway between Georgia Ave.-Petworth and Columbia Heights stations. The 12 customers on one train were stuck between those two stations for approximately one hour due to that response.

Just as the train in this event moved without speed commands, a separate radio communication to the ROCC stated that the unauthorized person on the roadway had been apprehended on Track 1, and was not on Track 2 where this train was moving. The ROCC intended that there be no train movement in this area at the time in order to protect against the risk of collision with MTPD personnel or the other individual who was on the roadway.

Approximately one minute later, the ROCC controller contacted the operator of Train 506 asking for their location, which was confirmed to be on approach to Columbia Heights. The Train Operator said they did have speed commands. The Train Operator said in the investigative interview that they obtained speed commands by moving a short distance so that they could continue on. Vehicle data show the train regained speed commands of 40 mph approximately 23 seconds after departing U Street Station, which is prior to the contact from the ROCC controller. The speed commands very briefly dropped out a short time later, and later increased to 50 mph.

The ROCC controller repeated that the instructions had been to reverse ends at U Street. The Train Operator stopped and asked the controller if they should stop the train at that point. The ROCC controller informed the operator they

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could continue on. Train 506 crossed back over to Track 1 to service Georgia Ave.-Petworth Station, and later arrived at Greenbelt at 11:57 a.m. This was the final scheduled trip of this operator's shift.

Probable Cause:

The probable cause of this event was Metrorail's lack of radio discipline, and Metrorail's lack of adequate protections against vehicle movement without speed commands. Contributing to this event was Metrorail's lack of comprehensive training, drills and efficiency testing for emergency situations, procedures and service disruptions to ensure that personnel maintain full situational awareness.

Corrective Actions:

Metrorail's Safety Department committed to an additional radio transmission monitoring evaluation process to identify findings and corrective actions, particularly during service disruptions. ROCC management will work with SAFE to address systemic issues that are identified.

Metrorail retrained the train operator.

WMSC staff observations:

WMATA has multiple open Corrective Action Plans (CAPs) that relate to issues identified in this investigation.

These CAPs include those related to movement with zero speed commands, red signal overruns, station overruns, the use of proper and complete radio protocols including 100 percent repeat-backs of all instructions, and the chaos and dysfunction in the ROCC during unplanned events and emergencies.

Although this event did not result in damage or injuries, it is the same type of movement that resulted in an October 2019 collision near Farragut West Station and a July 7, 2020 derailment outside Silver Spring Station.

In addition to the open CAPs noted above, this event is one of several indications that the WMSC has identified that WMATA may not have adequate physical characteristics training for employees.

The event also suggests Metrorail may need to reassess its procedures or implement procedures governing situations where ROCC controllers or interlocking operators provide train operators, equipment operators or others with multiple commands in a single transmission, particularly where aspects of those commands will not be carried out immediately.

Staff recommendation: Adopt final report.



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

FINAL REPORT OF INVESTIGATION A&I E20483

Date of Event:	12/09/2020
Type of Event:	Unintended Movement
Incident Time:	11:37 hrs.
Location:	Columbia Heights Station, Track #2
Time and How received by SAFE:	13:00 hrs., On-Call Phone
WMSC Notification Time:	13:06 hrs.
Rail Vehicle:	Train ID #506
	L7008-7009.7259.7258-7148.7149-7653.7052T
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20201209#90683

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Columbia Heights Station – Unintended Movement

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Abbreviations and Acronyms

AIMS Advanced Information Management System

ARS Audio Recording System

ATP Automatic Train Protection

CCTV Closed-Circuit Television

CENV Office of Vehicle Program Services

CMNT Office of Car Maintenance

I/A Incidents/Accidents

MSRPH Metrorail Safety Rules and Procedures Handbook

NOAA National Oceanic and Atmospheric Administration

ROCC Rail Operations Control Center

RTRA Office of Rail Transportation

SAFE Department of Safety and Environmental Management

SMS Safety Measurement System Incidents/Accidents

VMDS Vehicle Monitoring and Diagnostic System

WMATA Washington Metropolitan Area Transit Authority

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Executive Summary

On Wednesday, December 9, 2020, at approximately 10:30 hrs., the Rail Operations Control Center (ROCC) received a notification of an unauthorized person on the roadway between Georgia Ave Station and Columbia Heights Station, Track #1, involving Metro Transit Police Department (MTPD). The MTPD investigation required Train ID #314 (later designated as Train ID #714) to stop between Georgia Ave Station and Columbia Heights Station and for ROCC to de-energize third rail power. The ROCC initiated a single-track operation in the area that lasted until 12:40 hrs., after MTPD removed the person from the roadway and concluded the investigation.

At approximately 11:37 hrs., a Greenbelt Division Train Operator operating Train ID #506 [L7008-7009.7259.7258-7148.7149-7653.7052T] moved their train without speed commands in approach to Columbia Heights Station, Track #2. After receiving directions from the Rail Operations Control Center (ROCC) to proceed from Shaw-Howard U Station, Track #1, the Train Operator was instructed to cross over to Track #2, U Street Station, key down, reverse ends and continue on to Mt. Vernon Station, Track #1. The Train Operator serviced U Street Station, Track #2, and continued past their permissive block (without speed commands) in the direction on Columbia Heights Station, Track #2. The Train Operator was allowed to continue in service to Greenbelt Station and was subsequently removed from service at the Greenbelt Station platform. The consist was taken to the Greenbelt Yard for further analysis by the Office of Car Maintenance (CMNT) and Office of Vehicle Program Services (CENV). There were no reported injuries or equipment damage as a result of this incident.

Based on Audio Recording System (ARS) playback [radio and ambient], the Train Operator was instructed to depart Shaw-Howard U Station, cross over to Track #2 at U Street Station and reverse ends to be back in service towards Branch Avenue Station. The Train Operator affirmed the directions but did not complete them. After the ROCC transmitted instructions, the Train Operator moved the consist past the permissive block authorized by ROCC without speed commands.

At 11:35 hrs., according to Closed-Circuit Television (CCTV), the Train Operator arrived at U Street Station and came to a complete stop at the 8-car marker, serviced the station and closed the doors at 11:36 hrs. After closing the doors, the Train Operator departed in the direction of Columbia Heights Station. Their permissive block was established up to U Street Station and ROCC directed the Train Operator to reverse ends and proceed to Mt. Vernon Station.

The probable cause of the incident was the disruption in normal service due to single-tracking operations, which caused the Train Operator to lose their situational awareness. The Train Operator did not follow the directions given by ROCC after they had confirmed the directions through 100% repeat back. The Train Operator did not reverse ends as instructed and moved their train in the opposite direction of the instructions without speed commands. This action resulted in the Train Operator being removed from service for moving the consist without speed commands.

Upon report of a train moving without speed commands, SAFE conducted an analysis of data collected, reviewed submitted documentation and conducted formal interviews with staff. Based on a review of the Metro Safety Rules and Procedures Handbook (MSRPH), the train operator was not in compliance with the following Operating Rules:

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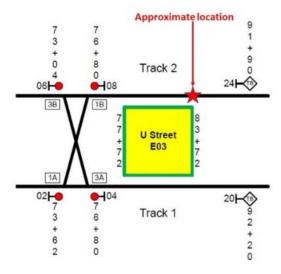
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- Section 3 Operating Rule: 3.18 "Employees shall not operate any vehicle in a reckless or unsafe manner."
- Section 3 Operating Rule: 3.79 "Train Operators shall not move trains with zero speed commands except after notifying ROCC and being given permission to move with zero speed commands and either a permissive block for the move going with traffic or an absolute block for the move going against traffic."
- SOP #15 Absolute Block / Permissive Block: 15.5.2.5.2 "Rail vehicle operators and Vehicle Flag persons shall, regardless of the controlling signal's aspect, not operate their vehicle beyond the established limits of the assigned absolute block."
- SOP #40.5.3.1 Prior to initiating the Close Door button, the train operator shall check the operating console for speed commands and check the roadway ahead of the train to ensure it is clear.
- General 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."

Incident Site

U Street Station, Track #2

Field Sketch/Diagram



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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.

Investigative Methods

The investigative methodologies included the following:

- Formal Interviews SAFE interviewed one individual as part of this investigation. The
 interview included persons present at, during, and after the time of the incident and those
 directly involved in the response process. The following individuals were interviewed:
 - Train Operator
- Documentation Review Collection of relevant work history information and process documentation contained in WMATA systems of record. These records include:
 - Train Operator Training Records
 - Train Operator Certifications
 - Train Operator 30-Day work history review
 - Metrorail Safety Rules and Procedures Handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA)
- System Data Recording Review Collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback [Radio and Landline Communications]
 - Closed-Circuit Television (CCTV)
 - Automated Information Management System (AIMS) Playback
 - Vehicle Program Services (CENV) Vehicle Monitoring and Diagnostic System (VMDS)

Investigation

Based on findings, at approximately 11:37 hrs., a Greenbelt Division Train Operator, operating Train ID #506 [L7008-7009.7259.7258-7148.7149-7653.7052T], moved their train without speed commands in approach to Columbia Heights Station, Track #2. At approximately 11:33 hrs., Train ID #506 was stationary at Shaw-Howard Station, awaiting instructions from ROCC due to Train ID #314 (later designated as Train ID #714) experiencing an emergency on Track #1 in between Columbia Heights Station and Georgia Ave Station. As the emergency was being secured, ROCC initiated single-tracking procedures around Train ID #714. The Train Operator of Train ID #506 was given a permissive block from ROCC and instructed to depart Shaw-Howard University Station, cross over to Track #2, proceed to U Street Station, reverse ends and move up to Mt. Vernon Station. The Train Operator acknowledged and proceeded towards U Street Station.

After the Train Operator arrived at U Street Station, they serviced the station but did not reverse ends as instructed. The Train Operator began to proceed towards Columbia Heights Station. As the Train Operator proceeded, they were contacted by ROCC and asked about their location and if they had speed commands. ROCC then corrected the Train Operator and informed that their instructions were to depart Shaw-Howard University Station, cross over to Track #2, proceed to U Street Station, reverse ends, proceed to Mt. Vernon Station and be back in service to Branch

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Avenue Station. The Train Operator acknowledged by only stating they have speed commands. ROCC then instructed the Train Operator to proceed to Greenbelt Station.

Chronological Event Timeline

ARS playback revealed, the Train Operator had traveled towards Columbia Heights Station, Track #2, which was not the direction given by ROCC. The Train Operator stated they had speed commands at the present time and were en route to Columbia Heights. ROCC gave the Train Operator permission to Greenbelt Station.

Time	Description
11:33:11 hrs.	ROCC contacts Train ID #506 at Shaw-Howard U Station, Track #1. [Radio]
11:33:16 hrs.	Train ID #506 Train Operator acknowledged. [Radio]
11:33:18 hrs.	ROCC asked the Train Operator if they are still keyed up to Greenbelt. [Radio]
11:33:21 hrs.	Train Operator responded, "That's affirm." [Radio]
11:33:23 hrs.	ROCC acknowledged and directed the Train Operator to close and continue on, cross over from Track #1 to Track #2 at U Street Station; if you lose your speed commands, verify the lunar at E02 crossing over from Track #1 to Track #2, permissive block to U Street Station 8-car marker, key down and reverse ends. 506 to 308, close doors and continue on, move down to Mt. Vernon Square Station, Track #1, over. [Radio]
11:33:41 hrs.	Train Operator responded, stating, "Copy, close and continue, move down to Mt. Vernon. [Radio]
11:33:44 hrs.	ROCC responded, "Affirm, Central's out." [Radio]
11:35:33 hrs.	Train ID #506 came to a complete stop at the 8-car marker, Track #2, U Street Station. [CCTV]
11:35:41 hrs.	Train ID #506 doors opened. [CCTV]
11:36:14 hrs.	Train ID #506 doors closed. [CCTV]
11:36:23 hrs.	Train ID #506 departed U Street Station. [CCTV]
11:37:36 hrs.	ROCC contacted Train ID #506. [Radio]
11:37:40 hrs.	Train Operator responded, "506, go ahead." [Radio]
11:37:41 hrs.	ROCC asked Train Operator for their location. [Radio]
11:37:45 hrs.	Train Operator responded, "Approaching Columbia Heights." [Radio]
11:37:47 hrs.	ROCC asked Train Operator if they have speed commands. [Radio]
11:37:54 hrs.	Train Operator responded, "I have speed commands." [Radio]
11:37:56 hrs.	ROCC responded, "Your instructions were to move down to U street, key down and reverse ends; you will be back in service to Branch Avenue, over." [Radio]
11:38:03 hrs.	Train Operator stated, "Stop? I have speed commands." [Radio]
11:38:20 hrs.	ROCC informed Train Operator they can continue in service. [Radio]
11:38:24 hrs.	Train Operator responded, "Roger, continuing on." [Radio]
11:38:26 hrs.	ROCC replied, "Affirm. Central out." [Radio]

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11:57:27 hrs.	Train Operator arrived at Greenbelt Station and contacted Yard Interlocking Operator. [Radio]
11:57:36 hrs.	Interlocking Operator informed Train Operator they would be out of service at the platform. [Radio]
11:57:44 hrs.	Train Operator acknowledged out of service at the platform. [Radio]
12:05:24 hrs.	ROCC contacted Greenbelt Tower and received the lead car number of Train ID #506 and the Train Operator's name. [Landline]

AIMS Playback

AIMS review revealed the Train Operator single-tracked around the emergency train (Train #ID 714) on Track #2, crossed over to Track #1, serviced Georgia Avenue-Petworth Station, Track #1 and proceeded to Greenbelt Station, Track #1. Train Operator was removed from service at Greenbelt.



Illustration #1 - Train ID #506 stationary at Shaw-Howard University U Station.



Illustration #2 - Train ID #506 crosses over to Track #2 towards U Street Station due to the single-tracking between Columbia Heights Station and Georgia Ave Station.

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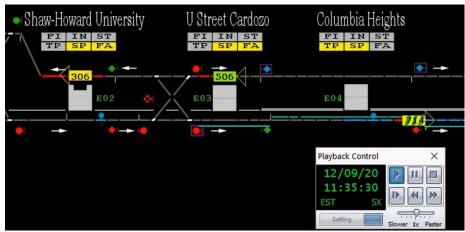


Illustration #3 - Train ID #506 services U Street Station, Track #2.

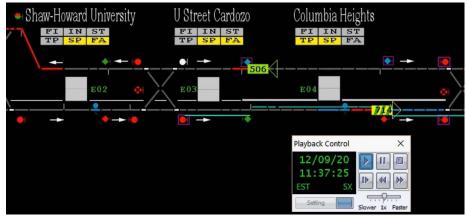


Illustration #4 - Train ID #506 continues on Track #2 with zero speed commands in the direction of Columbia Heights Station.

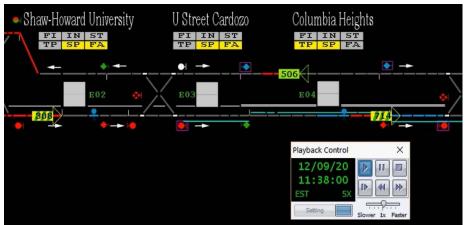


Illustration #5 - Train ID #506 comes to a complete stop on Track #2 in between U Street Station and Columbia Heights Station.

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Office of Chief Engineered (CENV) Vehicle Monitoring and Diagnostic System (VMDS) Timeline

VMDS analysis verified, Train ID #506 began to proceed from U Street Station, Track #2, using Stop and Proceed (Loss Of Speed Command-ATP Speed Limit 1) at approximately 11:36 hrs. This indicates the Train Operator did not verify they had speed commands before they moved the train towards Columbia Heights Station. ROCC subsequently contacted the Train Operator to verify their location and if they had speed commands.

Time	Description
11:35:35 hrs.	Train ID #506, with Lead Car 7008 serviced U Street Station on Track #2, headed to Columbia Heights Station.
11:36:20 hrs.	Train ID #506 began to proceed from U Street Station, Track #2, using Stop and Proceed [Loss Of Speed Command-Automatic Train Protection (ATP) Speed Limit 1] with gradual speed increasing. M/C position in P1.
11:37:04 hrs.	Train ID #506, while moving, ATP Speed Command increased to 40 mph. 766 feet traveled.
11:38:00 hrs.	Train ID #506 stops between U Street Station and Columbia Heights Station on Track #2 and continued with Speed command of 40 mph. 2,988 feet traveled.

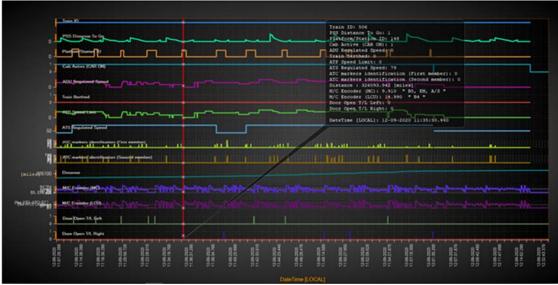


Photo #1 - Train ID #506 Serviced U Street Station, Track #2.

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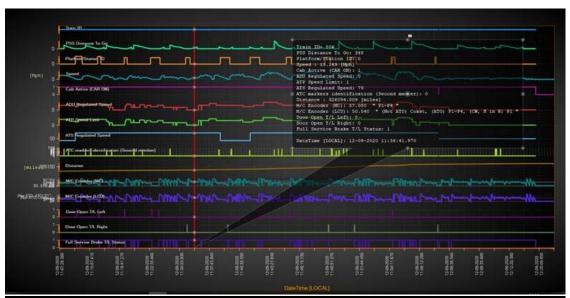


Photo #2 - Train ID #506 departed from U Street Station using Stop and Proceed (Loss Of Speed Command).

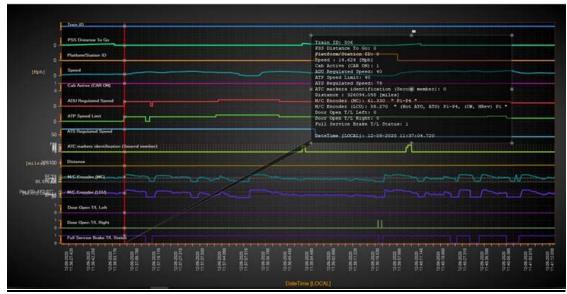


Photo #3 - Train ID #506 regains ATP Speed Readout limit 40 mph.

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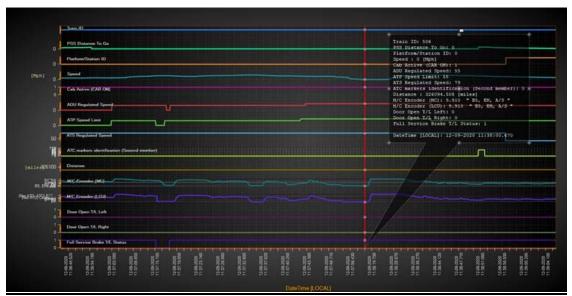


Photo #4 - Train ID #506 has stopped between U Street and Columbia Heights Station, Track #2. ATP Speed Command 55mph.

Interview Findings

Based on the investigation launched into the Improper Railcar Movement Incident, SAFE conducted an interview of the Train Operator which identified the following key findings associated with this event as follows:

The Train Operator stated they were given a permissive by ROCC to proceed to Columbia Heights Station and if they lose speed commands, continue on. There was another train ahead at U Street Station, Track #1, experiencing an emergency as the Train Operator awaited instructions from ROCC. There was a lot of radio traffic commencing and the Train Operator could not get through to conduct the 100% repeat of ROCC's instructions. After the train moved 5 feet, Train Operator stated they regained their speed commands and continued on to Greenbelt Station.

Findings

- A single-track operation was initiated by ROCC due to MTPD investigating an unauthorized person on the roadway event.
- The Train Operator operated their train consist in an unsafe manner and committed a safety violation. This is not in compliance with MSRPH Section 3 – Operating Rule 3.18 – "Employees shall not operate any vehicle in a reckless or unsafe manner."
- The Train Operator moved their train consist without speed commands. This is not in compliance with Section 3 Operating Rule: 3.79 "Train Operators shall not move trains with zero speed commands except after notifying ROCC and being given permission to move with zero speed commands and either a permissive block for the move going with traffic or an absolute block for the move going against traffic."
- The Train Operator proceeded past their permissive block while operating the train consist. This is not in compliance with SOP #15 Absolute Block / Permissive Block: 15.5.2.5.2 "Rail vehicle operators and Vehicle Flag persons shall, regardless of the controlling signal's aspect, not operate their vehicle beyond the established limits of the assigned absolute block."

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- The Train Operator did not verify if they had speed commands before departing U Street Station. This is not in compliance with SOP #40.5.3.1 – "Prior to initiating the Close Door button, the train operator shall check the operating console for speed commands and check Roadway ahead of the train to ensure it is clear."
- The Train Operator moved their train in the opposite direction of instructions received by ROCC even though they understood and acknowledged those instructions. This is not in compliance with MSRPH General 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."

Weather

At the time of the incident, the temperature was recorded at 41° F, winds S at 6 mph and cloudy with visibility of 10 miles. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: Washington, DC.)

Human Factors

Fatigue

Based on SAFE's interview questions related to Fatigue Factors and review of the Train Operator's 30-day work history, it was determined, the Train Operator's 30-day work schedule leading up to the incident was compliant with WMATA's Policy/Instruction 10.6/1 Hours of Service Limitations for Prevention of Fatigue and did not present a significant risk of impairment due to fatigue. Based on a formal interview, no personal factors would have increased the likelihood of fatigue-related impairment. The Train Operator had no history of sleep issues to report.

Post-Incident Toxicology Testing

After reviewing the Train Operator's post-incident testing results, it was determined the Train Operator involved was <u>not in violation</u> of the Drug and Alcohol Policy and Testing Program 7.7. 3/5, therefore, being under the influence of a controlled substance has been excluded as a contributing factor.

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Probable Cause Statement

The probable cause of the incident was the Train Operator's loss of their situational awareness, due to the disruption in normal service for single-tracking operations. The Train Operator did not follow the directions given by ROCC after they had confirmed the directions through 100% repeat back. The Train Operator did not reverse ends as instructed and move their train in the opposite direction of the instructions without speed commands. This action resulted in the Train Operator being removed from service for moving the consist without speed commands.

SAFE 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. Refer to the SMS I/A module for additional information.

Corrective Action Code	Description
90683_SAFECAPS _RTRA_001	Schedule and ensure Train Operator completes refresher training on Operating Rule 3.79
90683_SAFECAPS _SAFE_002	SAFE will develop a radio transmission performance monitoring evaluation process where ROCC radio transmissions will be audited, and resulting findings/corrective actions will be shared with ROCC leadership. Focus will be on similar conditions as this event (i.e., single tracking events).
90683_SAFECAPS _ROCC_003	ROCC management will partner with SAFE to correct any systemic issues noted as a result of 90683_SAFECAPS_SAFE_002.

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Appendix A – Interview Summary

Train Operator

This employee is a WMATA Train Operator with nine years of experience as a Train Operator and seven years of service as a Bus Operator. The Train Operator's last certification was in July 2020 and has no history of sleep issues to report.

Based on the SAFE interview, the Train Operator reported while at Shaw-Howard U Station, Track #1, they were listening to Central communicate over the radio as there was an incident ahead at the U Street Station. Train Operator stated they heard ROCC give them a permissive block from U Street to Columbia Heights Station, service and continue on if they lose speed commands. As the train moved approximately 5 feet from the U Street Station 8-car marker, the Train Operator stated they got their speed commands back and continued to Columbia Heights. ROCC then contacted the Train Operator to ascertain if they had speed commands. The Train Operator stated they stopped the train due to the tone of the ROCC Controller's request and affirmed they had speed commands. After ROCC was informed the Train Operator had speed commands, ROCC instructed them to continue on. Train Operator then continued on to Greenbelt and was removed from service after servicing Greenbelt. Train Operator stated the communications failures with the radio might have contributed to this incident occurring, as they did not hear the instructions clearly. Train Operator added they could not get through to ROCC to perform a 100% repeat back but thought they heard the transmission correctly and moved their train. When asked if they could have waited for the radio to clear, the Train Operator stated they could have waited but assumed they had clear instructions. This was the last trip of the evening for the Train Operator.

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