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WMSC Commissioner Brief: W-0090 – Red Signal Overrun – New Carrollton Yard – December 16, 2020

Prepared for Washington Metrorail Safety Commission meeting on June 29, 2021

Safety event summary:

A Train Operator operating an eight-car 7000-series consist incorrectly repeated back movement instructions to the New Carrollton Yard Interlocking Operator who affirmed the incorrect instructions, which led to the Train Operator moving Train 921 past a red signal that the Interlocking Operator had not initially granted permission to pass.

The Interlocking Operator had provided the Train Operator with an absolute block from the New Carrollton Station Platform to no closer than 10 feet before red Signal D99-54, with permission to pass a different red signal, Signal D99-50. An official WMATA track chart provided at one point during this investigation showed that D99-50 was not on the track, route or direction that the train operator was being directed to move the train, however the WMSC's independent review identified that the Interlocking Operator's board shows D99-50 is on the track where the route was set and would govern the train's movement, and the actual signal location matches the Interlocking Operator's board.

The Train Operator's repeat back (which was not word for word) did not match the Interlocking Operator's instruction, and instead stated that they had heard that they had permission to pass red signals at both D99-50 and D99-54. The Interlocking Operator replied "affirm" to that repeat back.

After the train passed signal D99-54, the Interlocking Operator contacted the Train Operator, and informed the operator that this was a red signal overrun. This was the Train Operator's last move of their shift.

Vehicle data demonstrates the train was moving approximately 8 mph when it passed D99-54.

The switches near D99-54 were clamped at the time of this event due to an ongoing track circuit malfunction that was preventing the Interlocking Operator from setting a lunar (proceed) signal. This track circuit issue was identified at approximately 5:30 a.m. on the day of the event, and ATC personnel were notified at approximately 5:40 a.m., approximately 18 hours before this red signal overrun. The issue was resolved approximately 24 hours after it was first reported.

Probable Cause:

The probable cause of this event was Metrorail's lack of complete training on and monitoring of territory and physical characteristics familiarization for its employees, and Metrorail's lack of radio protocol oversight and discipline.

Corrective Actions:

The Train Operator and Interlocking Operator received refresher training, including on radio protocols.

Rail Transportation produced and distributed a lessons learned document related to this event.

WMSC staff observations:

Metrorail has a long-open CAP related to creating radio discipline and ensuring radio protocols are followed. While performance in this area has improved dramatically in recent years, Metrorail still must make significant progress, which must continue even after the minimum requirements for closure are met.

This event is one of several signals that the WMSC has identified that WMATA may not have adequate physical characteristics training for employees. Knowledge of the territory and physical characteristics of the railroad is crucial to safe operations.

The WMSC continues to monitor Interlocking Operators through other oversight activities to assess whether there is proper training, focus and situational awareness.

Staff recommendation: Adopt final report.

Washington Metro Area Transit Authority

Department of Safety and Environmental

Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E20499

Date of Event:	12/16/2020
Type of Event:	Red Signal Overrun
Incident Time:	23:29 hrs.
Location:	New Carrollton Yard, Signal D99-54
Time and How received by SAFE:	23:40 hrs., On-Call Phone
WMSC Notification Time:	01:04 hrs.
Rail Vehicle:	Train ID #921 L7364.7365-7341.7340-7438.7439-7361.7360T
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20201217#90844MX

New Carrollton Yard – Red Signal Overrun

December 16, 2020

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Abbreviations and Acronyms

ARS	Audio Recording System
ATC	Automatic Train Control
CAP	Corrective Action Plan
CENV	Office of Vehicle Program Services
CMNT	Office of Car Maintenance
I/A	Incidents/Accidents
M/C	Master Controller
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
VMDS	Vehicle Monitoring and Diagnostic System
WMATA	Washington Metropolitan Area Transit Authority

Executive Summary

On Wednesday, December 16, 2020, at approximately 23:29 hrs., a Train Operator assigned to New Carrollton Division operating Train ID #921 [L7364-7365.7341-7340.7438-7439.7361-7360T] overran Signal D99-54 (Red) in New Carrollton Yard. The Office of Rail Transportation (RTRA) Management subsequently removed the Train Operator from service for post-incident toxicology testing. The Department of Safety and Environmental Management (SAFE) responded to the scene along with an RTRA Supervisor and Automatic Train Control (ATC) personnel. ATC personnel reported that Switches 55B and 57B near Signal D99-54 were previously clamped due to a prior Track Circuit malfunction not allowing the tower to establish a lunar; therefore, no damage occurred to the switches. In addition, there were no injuries reported as a result of this incident.

Based on Audio Recording System (ARS) playback, the Train Operator received instructions from the Interlocking Operator they had an absolute block to proceed no closer than 10 feet of Signal D99-54, with permission to pass Signal D99-50 (Red). The Train Operator did not conduct a 100% repeat back to the Interlocking Operator and replied they have a lunar at Signal D99-24, with permission to pass Signal D99-54 (Red) and Signal D99-50 (Red). The Interlocking Operator did not correct the erroneous repeat back and replied “affirm” to the Train Operator. RTRA Management removed the Interlocking Operator and Train Operator from service. RTRA Supervisors were dispatched to transport the Train Operator and Interlocking Operator for post-incident testing.

The probable cause of the incident was that the word for word repeat back was not conducted by the Train Operator. The Interlocking Operator did not correct the Train Operator’s erroneous transmission. These actions resulted in the Train Operator overrunning the red signal as they assume, they had permission to do so. This action is not in compliance with the Metrorail Safety Rules and Procedures Handbook (MSRPH) General Rule 1.79.

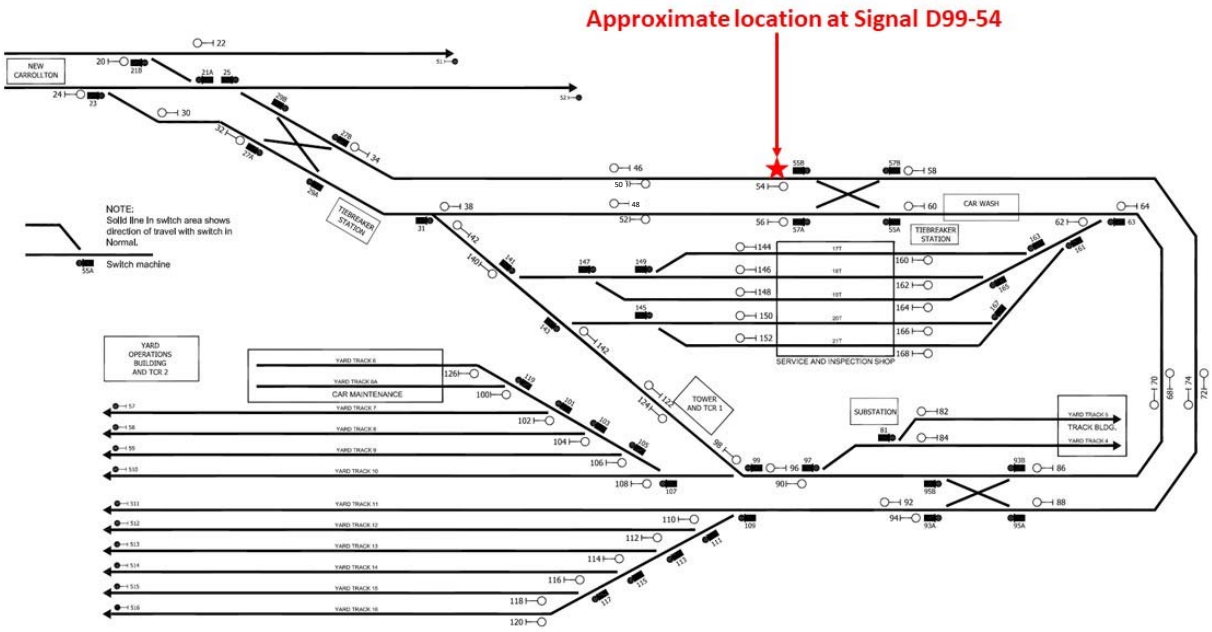
Upon reporting the red signal overrun, SAFE analyzed data collected, reviewed submitted documentation, and informal interviews with staff. Based on a review of the MSRPH, Train Operator was not in compliance with the following Operating Rules:

- Section 1 – 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.
- Section 3 – Operating Rule: 3.18 – “Employees shall not operate any vehicle in a reckless or unsafe manner.”
- Section 3 – Operating Rule: 3.67 – “Rail vehicles shall not be operated past or closer than a point 10 feet in approach of an interlocking signal or lamp displaying a red aspect, a red flag, or a dark interlocking signal, except at a bump post or entering a pocket Track, or unless authorized by The Rail Operations Control Center (ROCC) or the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1.”

Based on the employee's record, the Train Operator has been involved in one previous red signal overrun incident.

Incident Site
New Carrollton Yard, Signal D99-54

Field Sketch/Diagram



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:

- Physical Site Assessment

- Formal Interviews – Two individuals were interviewed as part of this investigation. Interviews will include persons present at, during, and after the incident and those directly involved in the response process. SAFE interviewed the following individuals:
  - Train Operator
  - Interlocking 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

- Interlocking Operator Training Records
- Interlocking Operator Certifications
- Interlocking Operator 30-Day work history review
- MSRPH
- National Oceanic Atmospheric Administration (NOAA)

- System Data Recording Review – Collection of information contained in Metro Data Recording Systems. This data includes:
  - ARS playback [Radio and Landline Communications]
  - Vehicle Program Services (CENV) Vehicle Monitoring and Diagnostic System (VMDS)

Investigation

Based on investigation findings, at approximately 23:29 hrs., the Office of Rail Transportation (RTRA) removed non-revenue Train ID #921 [L7364-7365.7341-7340.7438-7439.7361-7360T] Train Operator assigned to New Carrollton Division operating an eight-car consist in the New Carrollton Yard from service for overrunning Signal D99-54 (Red). The Train Operator was awaiting instructions from the Interlocking Operator at the New Carrollton Station Platform, Track #1, Signal D99-24, at approximately 23:26 hrs. The Interlocking Operator gave the Train Operator permission to enter with an absolute block no closer than 10 feet of Signal D99-54 (Red), with permission to pass Signal D99-50 (Red) and standby. After the Train Operator passed Signal D99-54 (Red), they were contacted by the Interlocking Operator and asked of their location.

ATCM personnel responded and reported no damages occurred to Switches 55B and 57B that are near Signal D99-54. Switch D99-55B was clamped by ATC before the red signal overrun occurred due to the Tower's inability to establish a lunar. At approximately 01:30 hours, ATC personnel reported no damage to ATC equipment and normal service resumed.

Based on ARS playback, the Interlocking Operator instructed the Train Operator to proceed from D99-24, Track #1 to no closer than 10 feet from Signal D99-54 (Red), with permission to pass Signal D99-50 (Red). The Train Operator performed an incorrect repeat back to the Interlocking Operator and replied they have a lunar at Signal D99-24 with permission to pass Signals D99-50 (Red) and D99-54 (Red). Interlocking Operator answered in the affirmative, and the Train Operator proceeded. After the Train Operator passed Signal D99-54(Red), the Interlocking Operator then contacted the Train Operator to ascertain their current location. The Train Operator verified they were past Signal D99-54 (Red) and that they overran the signal. The Interlocking then gave the Train Operator an incident time, and the RTRA Supervisor present in the control tower contacted ROCC to report the incident.

Chronological Event Timeline

ARS Analysis revealed:

Time	Description
23:26:54 hrs.	• Interlocking Operator: Asked Train Operator of Train ID #921 if they are standing-by at D99-24, Track #1. [Radio]
23:27:09 hrs.	• Train Operator: Confirmed they are standing-by at D99-24, Track #1. [Radio]
23:27:12 hrs.	• Interlocking Operator: Instructed the Train Operator to verify all lunars; they have an absolute block to no closer than 10 feet from Signal D99-54 (Red); you have permission to cross Signal D99-50 (Red). [Radio]
23:27:37 hrs.	• Train Operator: 24 lunar, permission to pass 54, 50 red. Roger that. [Radio]

23:27:50 hrs.	• Interlocking Operator: “Affirm.” [Radio]
23:30:36 hrs.	• Interlocking Operator: Attempted to contact Train Operator. [Radio]
23:30:40 hrs.	• Train Operator: Acknowledged the Interlocking Operator. [Radio]
23:30:41 hrs.	• Interlocking Operator: “What’s your location.” [Radio]
23:30:55 hrs.	• Train Operator: Acknowledged they are beyond Signal D99-54 (Red). Radio]
23:30:58 hrs.	• Interlocking Operator: “I gave you an absolute block up to Signal D99-54 (Red) and standby, correct?” [Radio]
23:31:23 hrs.	• Train Operator: Asks, “54 (Red), is that affirm?” [Radio]
23:31:27 hrs.	• Interlocking Operator: “Are you at 54 red right now?” [Radio]
23:31:48 hrs.	• Train Operator: Acknowledged they are beyond the red signal. [Radio]
23:31:51 hrs.	• Interlocking Operator: Instructs the Train Operator; their incident time is 23:31 hrs. [Radio]

CENV VMDS Timeline

Time	Description
23:25 hrs.	The train is keyed up at New Carrollton Station, Track #1, 8-car marker, Lead Car #7374.
23:27 hrs.	Master Controller (M/C) is placed between “P1-P4”. Train start moving gradually.
23:29 hrs.	Train overrun D99-54 Signal (Red). M/C position between “P1-P4”. Train speed at 8.392 mph. Approximately 1307 ft from the 8-car marker.
23:30 hrs.	The train came to a complete stop. Consist traveled 1,324 ft from D99-54 signal.
23:36 hrs.	The train is keyed down.

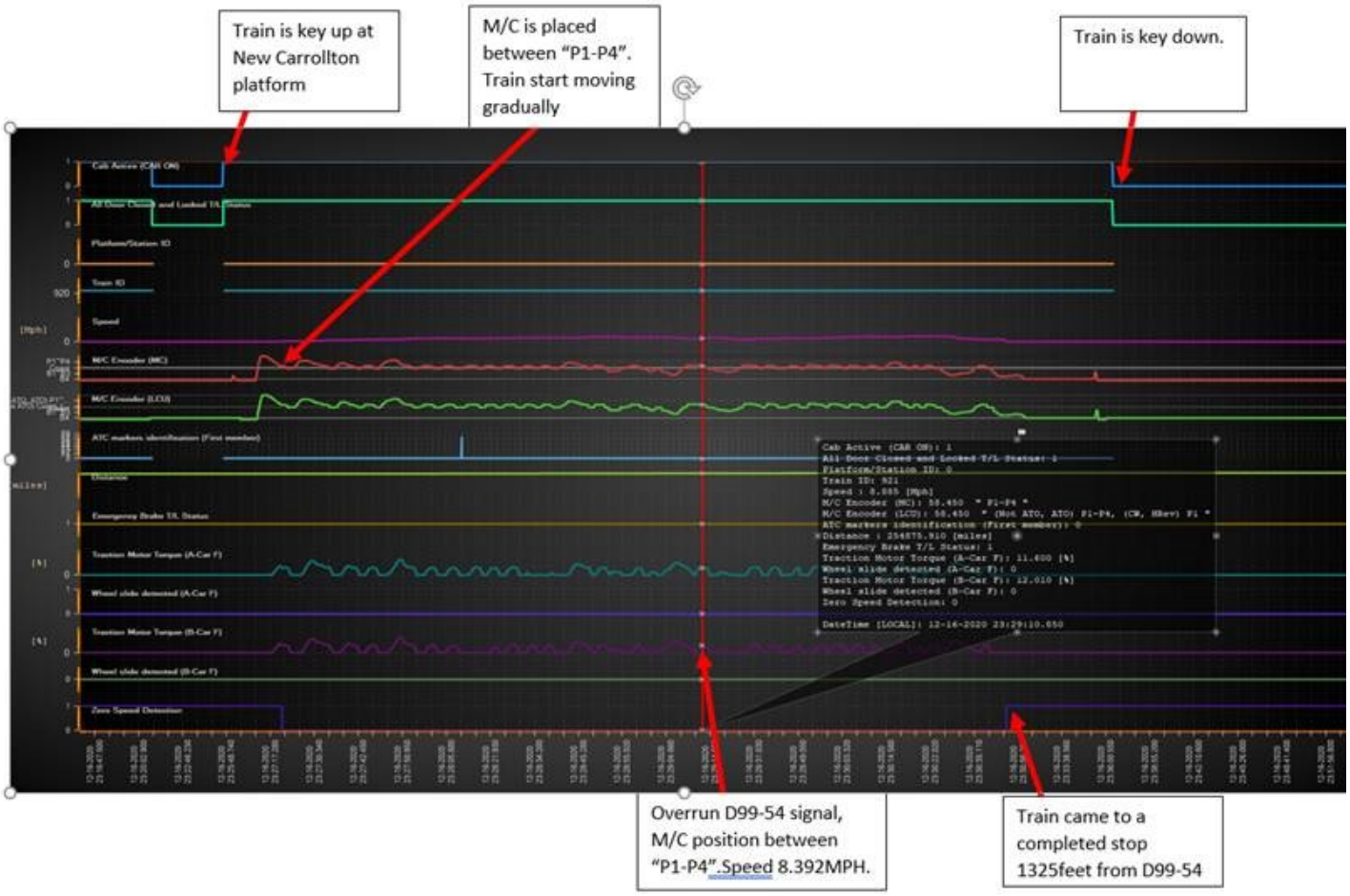


Figure 1: VMDS Diagram: CENV reported the train performed as designed. CENV did not observe any brake orf propulsion anomalies.

Interview Findings

Based on the investigation launched into the Red Signal Overrun Incident, SAFE interviewed the Train Operator and Interlocking Operator, which identified the following key findings associated with this event:

The Train Operator stated the Interlocking Operator instructed them to retrieve a train from the New Carrollton Station platform at Signal D99-24 and proceed to Signal D99-54. Train Operator stated he thought the Interlocking Operator gave them a lunar to proceed past Signal D99-54.

The Interlocking Operator stated they gave the Train Operator instructions to retrieve Train ID #921 from Platform #1 at New Carrollton Station and proceed no closer than 10 feet of Signal D99-54 (Red), with permission to pass D99-50 (Red).

Upon further review, the Interlocking Operator was permitted to pass the correct signal of D99-50(Red), which was on the same track as the Train Operator's travel. The ATC Signal Map used for this investigation depicts Signal D99-50 facing the opposite direction on the adjacent track.

Findings

- The Train Operator did not conduct a word for word repeat back to the Interlocking Operator, which resulted in the Train Operator conducted the incorrect train move. This action is not in compliance with – 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.

- The Train Operator did not safely operate the train consist by overrunning a red signal. This action is not in compliance with Operating Rule 3.18 – "Employees shall not operate any vehicle in a reckless or unsafe manner."

- The Train Operator overran Signal D99-54 (Red) did not comply with the Interlocking Operator directions. This action is not in compliance with Operating Rule 3.67, *"Rail vehicles shall not be operated past or closer than a point 10 feet in the approach of an interlocking signal or lamp displaying a red aspect, a red flag, or a dark interlocking signal, except at a bump post or entering a pocket Track, or unless authorized by ROCC or the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1."*

- The Interlocking Operator did not correct the Train Operator when the Train Operator did not perform a 100 percent repeat back of their instructions.

- Based on CENV data, the incident consist performed as designed, and CENV did not observe any brake or propulsion anomalies.

Weather

At the time of the incident, NOAA recorded the temperature at 33° F with overcast, 85% humidity, winds NNW at 15 mph, and visibility of 10 miles. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: New Carrollton, MD)

Human Factors

Fatigue

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

Post-Incident Toxicology Testing

After reviewing the Train Operator and Interlocking Operator's post-incident testing results, SAFE determined both employees complied with the Drug and Alcohol Policy and Testing Program 7.7.3/6.

Probable Cause Statement

The probable cause of the incident was the 100% repeat back was not conducted by the Train Operator, and the Interlocking Operator did not correct the Train Operator's erroneous transmission. These actions resulted in the Train Operator overrunning the red signal as they assumed, they had permission to do so. This action is not in compliance with the MSRPH General Rule 1.79.

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
90844_SAFECAPS_RTRA_001	Schedule and ensure Train Operator completes refresher training on General Rule 1.79 and Operating Rule 3.67.
90844_SAFECAPS_RTRA_002	Schedule and ensure Interlocking Operator completes refresher training on General Rule 1.79.
90844_SAFECAPS_RTRA_003	RTRA Management to produce and distribute Lessons Learned to department personnel.

Appendix A – Interview Summaries

Interview Details

Train Operator

This employee is a WMATA Train Operator with 20 years of service: seven years as a Train Operator and 13 years of service as a Bus Operator. The Train Operator's last certification was in November 2019 and has no history of sleep issues to report.

Based on the SAFE interview, the Train Operator reported the Interlocking Operator instructed him to pick up Train ID #921 from the New Carrollton Platform on Track #1. Train Operator stated they walked to the platform, keyed up the train, and waited for the Interlocking Operator instructions at Signal D99-24. Next, the Train Operator reported they thought the Interlocking Operator gave them a lunar at Signal D99-24 and permission to pass Signals D99-50 (Red) and D99-54 (Red). The Train Operator stated they had no mechanical problems with the consist, and during the time of the incident, there were no distractions. After the Train Operator proceeded from D99-24, they were contacted by the Interlocking Operator of their position. The Train Operator stated they informed the Interlocking Operator they were beyond Signal D99-54 and subsequently was given an incident time and told to standby. Train Operator stated radio communications were poor, and that may have contributed to the incident. The only thing reported by the Train Operator that could have prevented this incident from occurring was to be off from work. This was the Train Operator's last move of the evening.

Interlocking Operator

This employee is a WMATA Interlocking Operator with a total of 16 years of service: six months as an Interlocking Operator, seven years and six months of service as a Train Operator, seven years and nine months as a Bus Operator and eight months as a Car Cleaner. The Interlocking Operator's last certification was in January 2019 and has no history of sleep issues to report.

Based on the SAFE interview, the Interlocking Operator reported they started their shift at 22:00 hrs. and were laying trains in the yard. During the incident, they stated there were no distractions, and an RTRA Supervisor was present in the Control Tower. Poor communication was the contributing factor given by the Interlocking Operator. Interlocking Operator stated they instructed the Train Operator to bring Train ID #921 into the New Carrollton Yard from Signal D99-24 to Signal D99-54 (Red). Interlocking Operator stated they gave the Train Operator permission to pass the red signal at D99-50 only. After the Train Operator passed Signal D99-54 (Red), the Interlocking Operator stated they noticed occupancy on the control panel beyond Signal D99-54 and asked the Train Operator of their location. After confirmation, the Train Operator had traveled past Signal D99-54 (Red), the Interlocking Operator notified ROCC of the incident and instructed the Train Operator to stop the train. The Interlocking Operator stated they do not think they contributed to the incident, and there was not anything they could have done to prevent the incident from occurring.

Appendix B – Incident Photos

Photo #1: Signal D99-54. Incident consist (left) stationary 1,324 feet past signal.

Photo #2: Signal D99-50. Incident consist (left) stationary 1,324 feet past Signal D99-54.

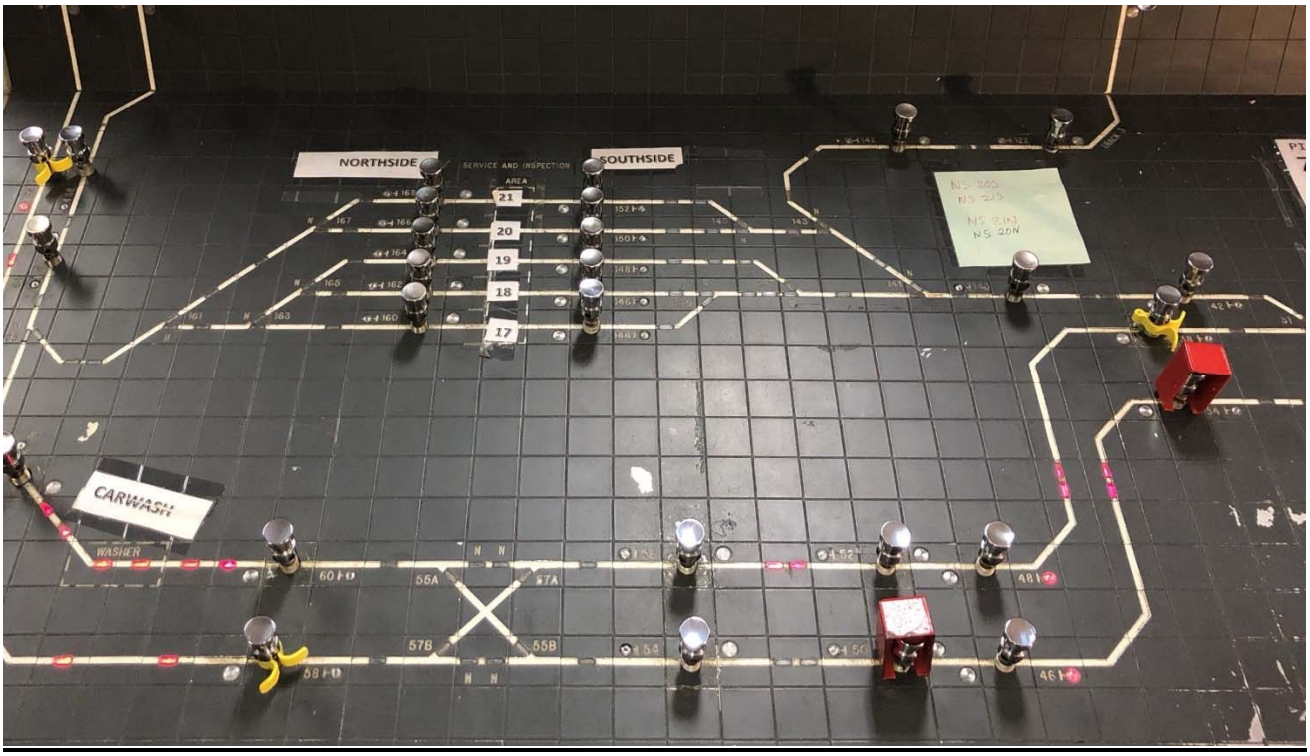


Photo #3: Interlocking Operator Board depicting Yard Signals.

Photos #4 and #5: Incident train traveled through Switch 57B (clamped) after passing Signal D99-54 (Red). ATC found no damage.

Photos #6 and #7: Incident train traveled through Switch 55B (clamped) after passing Signal D99-54 (Red). ATC found no damage.