



WMSC Commissioner Brief: W-0072 – Red Signal Overrun – Brentwood Yard – October 29, 2020

Prepared for Washington Metrorail Safety Commission meeting on April 13, 2021

Safety event summary:

A train operator moved Train ID 703 past red signal B99-138 in the Brentwood Yard.

The Interlocking Operator had given the Train Operator directions to move to that signal and to stop no closer than 10 feet from that signal after making appropriate safety stops, and the Train Operator had acknowledged those instructions.

The Train Operator did not make any safety stops and stopped only after passing the red signal. Metrorail rules do not require safety stops in this situation approaching a red signal, however operators in Brentwood Yard are instructed by interlocking operators to conduct safety stops approaching a red signal. The Train Operator then reported over the radio that they thought the train had overrun the red signal.

The train trailed the switch associated with the signal. An inspection found no damage to the railcars or switch.

In an investigative interview, the Train Operator stated it was hard to identify their position in the yard and hard to see due to the light rain and high humidity. The Train Operator said that they did not conduct safety stops because they did not know they were approaching the signal.

Probable Cause:

The probable cause of this event was Metrorail's insufficient training and yard familiarization for vehicle operators, including track configuration and signal locations.

Corrective Actions:

Metrorail plans to develop and implement a training plan for recently certified train operators focusing on each rail yard's specific features and hazards.

Metrorail is also distributing a lessons learned document emphasizing safety stops and approaching red signals.

Staff recommendation: Adopt final report.



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

FINAL REPORT OF INVESTIGATION A&I E20417

Date of Event:	10/29/2020
Type of Event:	Red Signal Overrun
Incident Time:	20:15 hrs.
Location:	Brentwood Yard, Signal B99-138
Time and How received by SAFE:	20:45 hrs. – SAFE On-Call Phone
WMSC Notification Time:	21:26 hrs.
Rail Vehicle:	Train ID 703 L6126-6127.6163-6162.6195-6194T
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20201029#89846

Brentwood Yard – Red Signal Overrun

October 29, 2020

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ABBREVIATIONS AND ACRONYMS

ARS	Audio Recording System
ATCM	Automatic Train Control Maintenance
CCTV	Closed-Circuit Television
CENV	Vehicle Program Services
CMNT	Office of Car Maintenance
MOC	Maintenance Operations Center
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic Atmospheric Administration
ROCC	Rail Operations Control Center
ROQT	Rail Operations Quality Training
RTRA	Office of Rail Transportation
SAFE	Department of Safety and Environmental Management
VMS	Vehicle Monitoring System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

EXECUTIVE SUMMARY

On Thursday, October 29, 2020, at approximately 20:15 hrs., Office of Rail Transportation (RTRA) management personnel removed Train ID 703 [L6126-6127.6163-6162.6195-6194T] Train Operator from service for overrunning Signal B99-138 (Red) at the Brentwood Yard on Track #1. This Train Operator was assigned to the Shady Grove Division and was operating a six-car consist. The Rail Operations Control Center (ROCC) notified SAFE at approximately 20:45 hrs. Response personnel include representatives from SAFE, an RTRA Supervisor, and Automatic Train Control Maintenance (ATCM) personnel. Vehicle Program Services (CENV) verified that Train ID 703 failed to complete the required safety stops, overran Signal B99-138, Track# 1 and stopped the consist 231 feet beyond Signal B99-138; this was confirmed by reviewing the Closed-Circuit Television (CCTV) and Vehicle Monitoring and Diagnostic System (VMDS).

The Train Operator acknowledged the Interlocking Operator's instructions to secure the train consist 10 feet from Signal B99-138 (Red) based on Audio Recording System (ARS) playback. However, the Train Operator failed to follow the Interlocking Operator instructions and overran the red signal. The Train Operator communicated over the radio "I think I passed the signal I was instructed to move the train to" after realizing the error. RTRA management removed the Interlocking Operator and Train Operator from service after the red signal overrun verification. RTRA Supervisors were dispatched to transport the Train Operator and Interlocking Operator for post-incident testing.

The probable cause of this event was Metrorail's insufficient training and yard familiarization for vehicle operators, including track configuration and signal locations.

Based on investigation information and a review of the MSRPH, the Train Operator was not in compliance with the following Operating Rules:

1. Operating Rule 3.89, "Safety stops when required, must be made three (3) car lengths, then two (2) car lengths, then fifty (50) feet, then ten (10) feet and then proceed at a speed not to exceed three (3) mph until final stop is made."
2. 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 ROCC of the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1."

INCIDENT SITE

Brentwood Yard, Signal B99-138

FIELD SKETCH/DIAGRAM

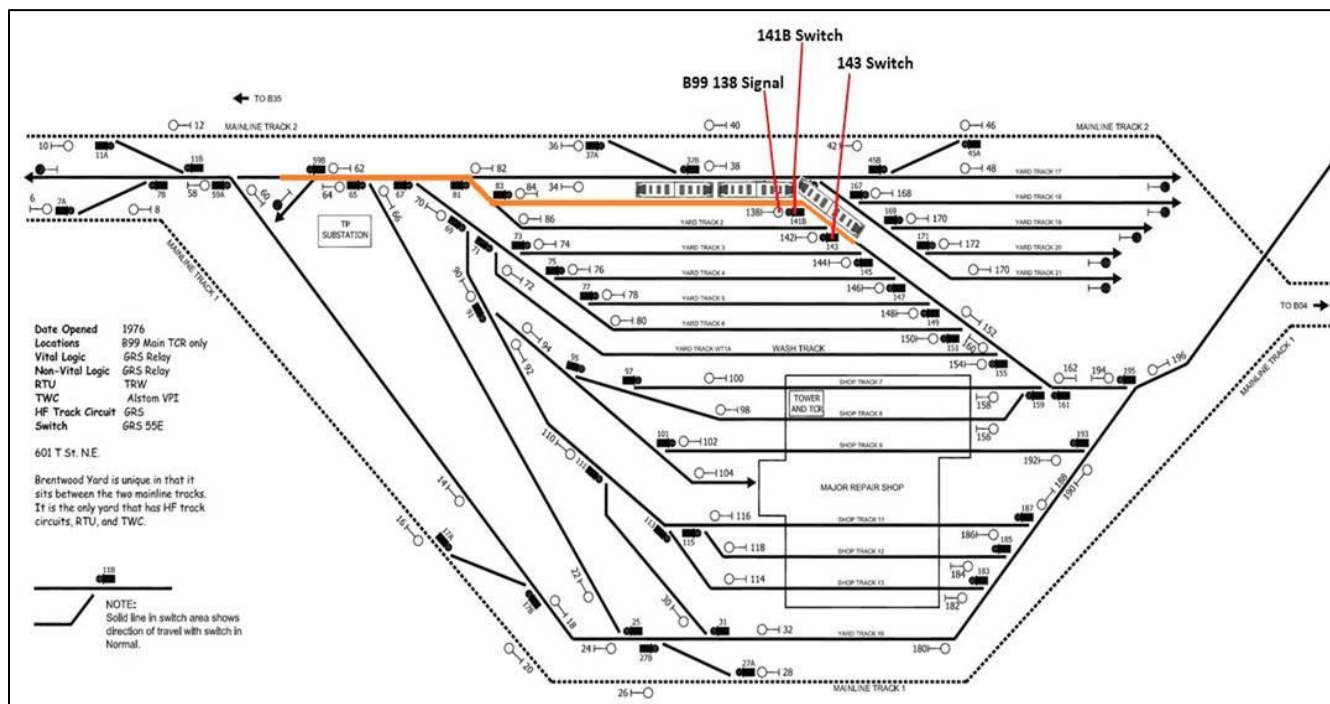


Figure 1: Track Diagram of Brentwood Yard, with impacted signal and switch identified.

PURPOSE AND SCOPE

The purpose of this incident investigation 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 – SAFE interviewed two individuals as part of this investigation. Interviews included persons present at and/or after the incident and those directly involved in the response process. SAFE interviewed the following individuals:
 - Train Operator
 - Interlocking Operator
- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of records. These records include:
 - Train Operator Training Record

- Train Operator Certifications
 - Train Operator 30-Day work history review
 - Interlocking Operator Training Record
 - Interlocking Operator Certifications
 - Interlocking Operator 30-Day work history review
 - MSRP
 - National Oceanic Atmospheric Administration (NOAA)
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - ARS playback [Radio and Landline Communications]
 - CCTV
 - CENV VMS

INVESTIGATION

Based on findings, at approximately 20:15 hrs., RTRA removed Train ID 703 [L6126-6127.6163-6162.6195-6194T] Train Operator assigned to Shady Grove Division operating a six-car consist in the Brentwood Yard from service for overrunning Signal B99-138 (Red), Track #1. The Train Operator arrived at Brentwood Yard at approximately 20:12 hrs. The Interlocking Operator gave the Train Operator permission to enter with an absolute block to the South Bump Post, verify all lunars, correct rail, key down and reverse. After the Train Operator changed ends, they contacted the Interlocking Operator and were standing by.

As a result of the event, the ROCC dispatched an RTRA Supervisor to transport the Train Operator and Interlocking Operator for post-incident analysis testing.

Chronological Event Timeline

Based on ARS playback, the Interlocking Operator instructed the Train Operator to secure the train consist 10 feet from Signal B99-138. The Interlocking Operator directed the Train Operator to proceed on Track #1, follow all lunars and correct rail alignment along the way, make all safety stops, stop no closer than 10 feet from red signal B99-138, and secure the train at that location. The Train Operator performed a repeat back that was less than 100%. The Interlocking Operator corrected the transmission and stated to conduct safety stops in approach to the signal. The Train Operator acknowledged and repeated back to the Interlocking Operator to conduct safety stops in approach to Signal B99-138. The Train Operator did not conduct any safety stops and overran Signal B99-138 by 231 feet.

Time	Description
20:16:20 hrs.	The Train Operator of Train ID 703 reported to the Interlocking Operator they have reversed ends 10 feet from the South Bump Post and awaiting further directions. [Radio]
20:16:33 hrs.	The Interlocking Operator instructed the Train Operator of Train ID 703 they have a lunar at Signal B99-64 and proceed on Track #1. Then, follow all lunars and correct rail alignment the way, make all safety stops, stop no closer than 10 feet from red signal B99-138, and secure train at that location. [Radio]

20:16:54 hrs.	The Train Operator of Train ID 703 repeated to Interlocking Operator they have a lunar at Signal B99-64, proceed on Track #1 and secure train consist no closer than 10 feet from red signal B99-138 [Radio]
20:17:11 hrs.	The Interlocking Operator replied, "Make sure you give me some safety stops please." [Radio]
20:17:16 hrs.	The Train Operator stated, "Affirm. Make safety stops over." [Radio]
20:19:03 hrs.	The Interlocking Operator attempted to contact Train Operator regarding their location. No response. [Radio]
20:20:49 hrs.	The Interlocking Operator attempted to contact Train Operator a second time regarding their location. No response. [Radio]
20:20:54 hrs.	The Train Operator acknowledged the Interlocking Operator. [Radio]
20:21:03 hrs.	The Train Operator stated they think they overran the red signal. [Radio]
20:21:26 hrs.	The Interlocking Operator instructed Train Operator to key down and stand by. [Radio]
20:21:32 hrs.	The Train Operator stated, "Affirm. Key down, standing by, over." [Radio]
20:32:04 hrs.	ROCC received a report of a red signal overrun at Brentwood Yard. [Landline]

Note: Times above may vary from other data based on clock settings.

Closed-Circuit Television (CCTV)

Based on CCTV, SAFE determined the Train ID 703 did not make any safety stops on approach to Signal B99-138, Track #1, from approximately 20:19:43 hrs. to 20:20:27 hrs.

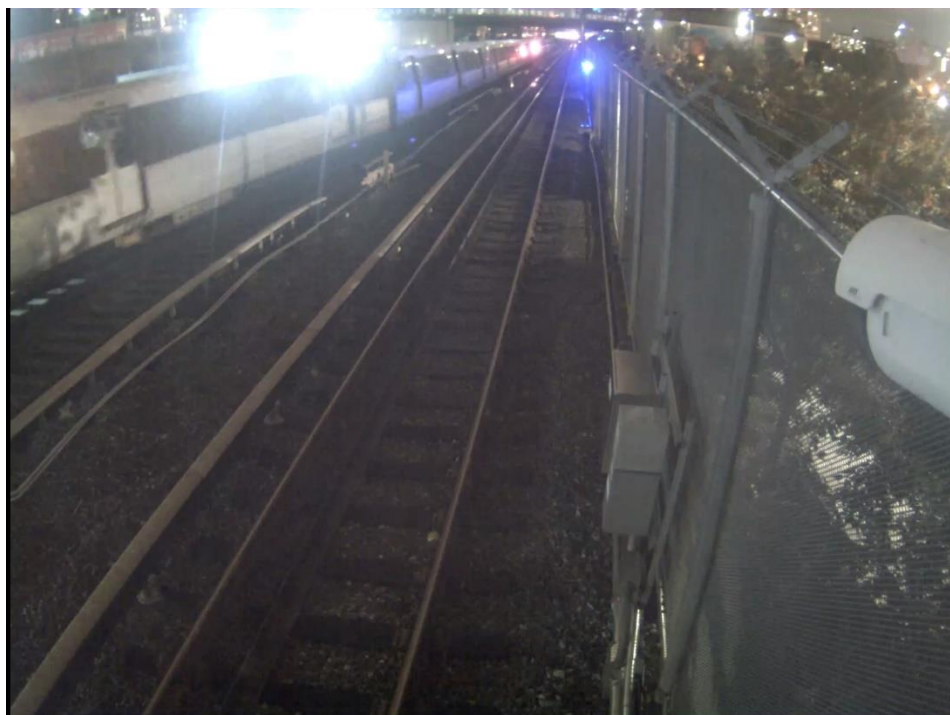


Photo 1: CCTV footage showing weather was clear and not raining during the incident. CCTV also verified the Train Operator did not make the required safety stops.

Office of Vehicle Program Services (CENV)

Vehicle Program Services (CENV) review of the Vehicle Monitoring System (VMS) showed that Train ID 703 failed to complete the required safety stops, overran Signal B99-138, Track# 1, and stopped the consist 231 feet beyond Signal B99-138.

Time	Description
20:18:58 hrs.	The Train Operator of Train ID 703 reversed ends and started moving from B99-64 towards Track #1.
20:20:05 hrs.	Before overrunning signal B99-138, Train was on coast and speed decreasing from 12 to 10 mph.
20:20:05 hrs. - 20:20:27 hrs.	CENV analysis did not show the Train Operator performed safety stops while the train was approaching signal B99-138.
20:20:27 hrs.	The Train Operator of Train ID 703 train went briefly to B1 then back to coast, overrunning the signal B99-138 at 10 mph.
20:20:27 hrs. - 20:20:48 hrs.	After Train Overran B99-138, the Master Controller position changed multiple times from coast to B1 and vice versa until the train came to a stop 231 feet away from the signal.

Note: Times above may vary from other data based on clock settings.

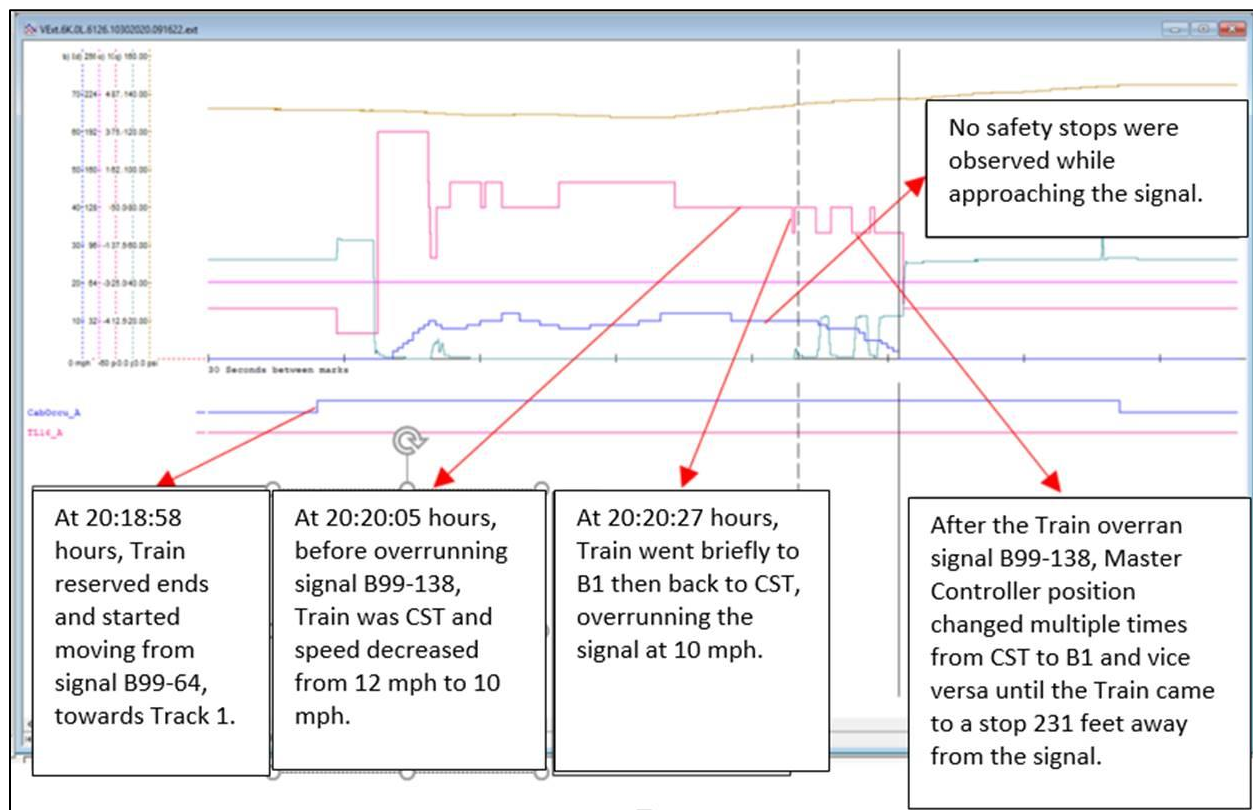


Figure 2: ER Graphical Analysis

Automatic Train Control Maintenance (ATCM)

ATCM was notified by Maintenance Operations Center (MOC) to perform an inspection for a possible trailed switch. Upon arrival, they found the incident train positioned on top of Switches 141B and 143. ATCM advised MOC and ROCC that once the incident train is clear of the switches, they can perform the tests. Before RTRA moved the incident train, ATCM checked all relays associated with both switches. All logic was correct for a normal move through both switches; nothing showed out of correspondence. Switch 143 (M6) passed obstruction, switch point opening, and hand-crank cut out test. Switch 141B (55E) passed the obstruction, switch point opening, point detector, and hand-crank cut out tests. ATCM placed both switches back in service, and ATCM informed MOC and ROCC of the test results.



Photo 2: ATCM Photo – Switch 141B with switch cover removed and showing no signs of damage.



Photo 3: ATCM Photo – Switch 143 with switch cover removed, showing no signs of damage.

IMMEDIATE MITIGATION TO PREVENT RECURRENCE

- RTRA Management removed the Train Operator and Interlocking Operator from service.
- RTRA removed the incident train from service for CENV and Office of Car Maintenance (CMNT) post-incident inspection and investigative processes.
- ATCM performed tests on Switches 141B and 143.
- CENV downloaded and performed an analysis of VMDS data.
- CMNT conducted a post-incident inspection of the incident consist.

INTERVIEW FINDINGS

Based on the investigation launched into the Red Signal Overrun incident, SAFE conducted two (2) interviews via Microsoft Teams, including the investigation team, relevant WMATA Management, and representatives from the Washington Metrorail Safety Commission (WMSC). These interviews identified the following key findings associated with this event.

The Train Operator said they were familiar with operating the 6k series and how to conduct safety stops. The Train Operator stated they did not conduct safety stops due to not knowing where Signal B99-138 was located along the route.

The Interlocking Operator stated they gave the Train Operator instructions to stop no closer than 10 feet from Signal B99-138 and the Train Operator conducted a 100% repeat back of the instructions. They did not observe the Train Operator make any of the required safety stops. After the Interlocking Operator verified Signal B99-138 was overrun, the Interlocking Operator reported the incident to ROCC and the RTRA Supervisor. They stated that although it was night time, the weather was good and not raining.

FINDINGS

- The Train Operator overran Signal B99-138 (Red) without making required safety stops as instructed by the Interlocking Operator. This is not in compliance with 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 ROCC of the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1.”*
- Based on CENV data, the incident consist performed as designed, and CENV did not observe any brake or propulsion anomalies.
- The Train Operator did not have any previous red signal overrun events based on the employee’s record.

WEATHER

At the time of the incident, NOAA recorded the temperature at 54° F with light rain and mostly cloudy, 89% humidity, winds NNW at 12 mph with 2 miles of visibility. 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 and Interlocking Operator's 30-day work histories, SAFE determined the Train Operator and Interlocking Operator's 30-day work schedules leading up to the incident were compliant with WMATA's Policy/Instruction 10.7/1 Hours of Service Limitations for Prevention of Fatigue.

Post-Incident Toxicology Testing

After reviewing the Train Operator's and Interlocking Operator's post-incident testing results, SAFE determined the Train Operator and Interlocking Operator involved were not in violation of the Drug and Alcohol Policy Testing Program 7.7. 3/5

PROBABLE CAUSE STATEMENT

The probable cause of this event was Metrorail's insufficient training and yard familiarization for vehicle operators, including track configuration and signal locations.

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
89846_SAFECAPS_RTRA_001	Develop and implement a training plan to ensure all recently certified Train Operators participate in a rail yard-specific familiarization course for all yards focusing on each yard's unique features and hazards.
89846_SAFECAPS_RTRA_002	Develop and distribute a lessons learned based on the incident facts, with an emphasis on the importance of safety stops and approaching red signals.

APPENDIX A – INTERVIEW SUMMARIES

Interview Details

Train Operator

The Train Operator is a WMATA employee with eight months of experience as a Train Operator and three years of service as a Bus Operator. The Train Operator's last certification was in March 2020, and the Train Operator has no history of sleep issues to report.

Based on the interview, the Train Operator stated the following:

After arriving at Brentwood Yard, they were instructed to reverse ends at the bump post and standby for further instructions. After the Train Operator reached the bump post, the Interlocking Operator instructed the Train Operator to proceed on Track #1 and secure the consist 10 feet before reaching Signal B99-138. The Train Operator stated it was hard to see the signals to orient themselves of their location due to the rainy weather conditions and faulty windshield wipers when proceeding to the signal. When asked if they reported the defective windshield wipers, the Train Operator stated the discrepancy was reported but had not been corrected. They continued to say most of the windshield wipers on the 6K series trains they operated were faulty. The Train Operator reported they were familiar with operating the 6k series and how to conduct safety stops. The Train Operator did not perform safety stops due to not knowing where Signal B99-138 was located along the route. After the Train Operator realized they passed the signal, the occurrence was reported to the Interlocking Operator and was instructed to key down and standby. They stated newness to Brentwood Yard and faulty windshield wipers contributed to the red signal overrun, although they were fully alert when the incident occurred. The Train Operator was subsequently removed from service and taken for post-incident toxicology testing.

Interlocking Operator

The Interlocking Operator is a WMATA employee with one year and six months of experience as a Bus Operator, one year and six months of experience as a Train Operator, nine years of experience as a Station Manager and three years of service as an Interlocking Operator. The Interlocking Operator's last certification was in March 2020 and has no history of sleep issues to report.

Based on the interview, the Interlocking Operator stated the following:

At the time of the incident, the Interlocking Operator operated in the Yard Tower alone and with no distractions. Before the incident, the Interlocking Operator stated they set the lead and observed the Train Operator move the train. The Interlocking Operator reported they instructed the Train Operator they have a lunar at Signal B99-64, proceed on Track #1, follow all lunars and correct rail alignment the way, make all safety stops, stop no closer than 10 feet from red signal B99-138. The Train Operator affirmed by conducting a 100% repeat back of the instructions given. After the Train Operator passed Signal B99-138 (Red), the Interlocking Operator stated they looked through the window and then went outside to verify the signal was overrun. After the verification, they contacted ROCC and the RTRA Supervisor to inform them of the incident. The Interlocking Operator reported they did not observe the Train Operator make any safety stops before passing Signal B99-138.

Additionally, they stated the weather conditions were good during the night, and it was not raining. The Interlocking Operator said the Train Operator was new, and being unfamiliar with the yard

contributed to them overrunning the red signal. Furthermore, they described the only action that could have been performed to prevent the incident from occurring was to set the lead to the other side of the Signal B99-138. The Interlocking Operator was subsequently removed from service and taken for post-incident toxicology testing.

APPENDIX B – INCIDENT PHOTOS



Photo 4: Perspective of consist location after overrunning the B99-38 signal, which is behind the point of where the photos was taken.



Photo 5: Incident train traveled through Switch 141B after passing Signal B99-138 (Red), Track #1.



Photo 6: Incident train traveled through Switch 143 after passing Signal B99-138 (Red), Track #1.



Photo 7: Switch 141B after RTRA moved the incident train. ATCM found no damage.

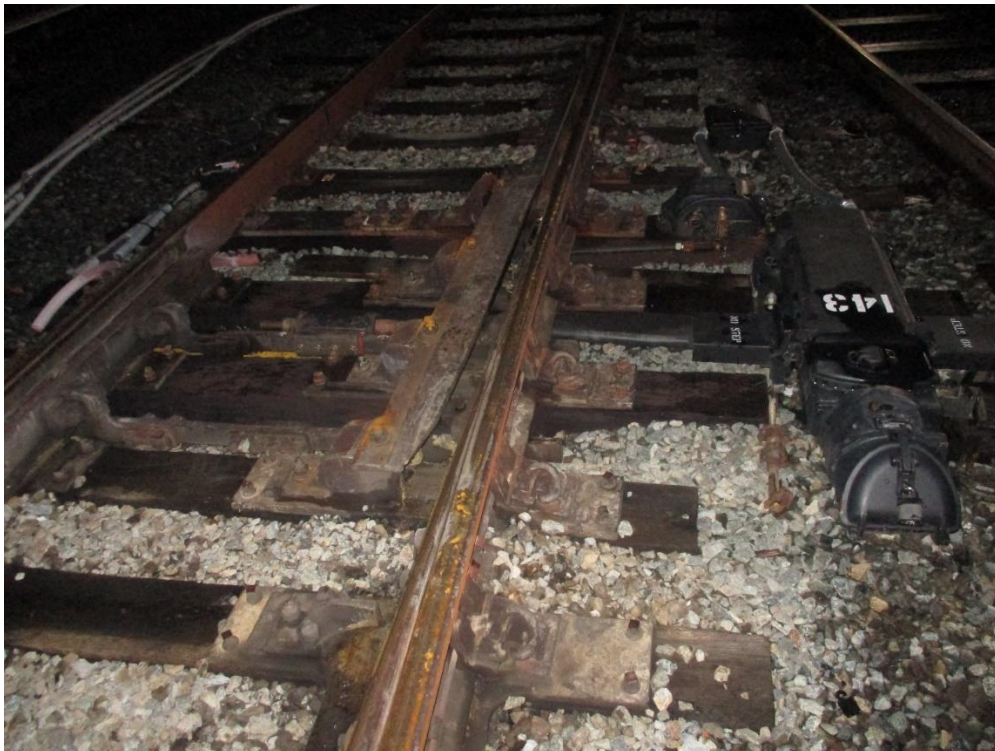


Photo 8: Switch 143 after RTRA moved the incident train, ATCM found no damage.



Photo 9: Signal B99-138, Track #1. Incident consist (left) stationary 231 feet past signal.

[illegible]

Figure 3: Switch Obstruction Test Data Sheet.

