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WMSC Commissioner Brief: W-0118 – Near-Miss/Red Signal – West Falls Church Yard – February 1, 2021

Prepared for Washington Metrorail Safety Commission meeting on October 26, 2021

Safety event summary:

The West Falls Church Yard Interlocking Operator attempted to change movement instructions for a Train Operator to prevent two trains directly toward each other on the same track, but the Train Operator did not acknowledge the transmission, and proceeded following the originally understood absolute block. The Train Operator stopped after operating past a signal that the Interlocking Operator had changed to red, prior to any collision.

Although passing that signal was part of the originally understood absolute block (permission to move through an area as the sole vehicle in that specific track segment), the Interlocking Operator had not explicitly given the Train Operator permission to move or to pass that signal as a red signal. The radio communications did not follow protocols for 100 percent repeat back or use of proper terminology related to critical safety processes such as absolute blocks, movement and signal aspects. For example, the Train Operator, not the Interlocking Operator, initiated the movement instructions that were then improperly acknowledged by the Interlocking Operator.

At the time of this event, recordings from the Yard Tower demonstrate that the Interlocking Operator was distracted by a personal phone conversation, and had a high workload. The Interlocking Operator's workload included attempting to locate track inspection personnel who were initially supposed to be on the deicer train that was attempting to depart the yard, and brief interactions with the Rail Operations Control Center (ROCC).

The train involved in this event was being used as a polisher train to keep the third rail free of ice buildup, since the track personnel who were needed in order to use it as a deicer train were not present. There was a train operator at each end of the train.

The Train Operator operating the train at the time it passed this red signal had just keyed up that end of the train and told the Interlocking Operator that the train would move from signal K99-74 to N91-44. The Interlocking Operator acknowledged this, which the Interlocking Operator and Train Operator understood this acknowledgement to be the granting of an absolute block.

After that block was understood to have been granted at approximately 10:55 a.m., the Interlocking Operator attempted to change the absolute block to stop this polisher train due to another train moving toward the yard from the mainline. Automatic Train Control (ATC) records indicate the Interlocking Operator set the route for the polisher train at approximately 10:47 a.m., the Interlocking Operator then changed the signal to red approximately two minutes before the train passed the red signal.

The Interlocking Operator had changed the signal to red as part of an effort to prevent the polisher train leaving the yard from moving directly toward another train headed in the opposite direction on the same route. The other train entering the yard from the Silver Line was stopped at signal K99-100, the next signal location (at same location as N91-44 but governing movement in the opposite direction) after K99-98 on the route set for the polisher train. This signal aspect change was done without ensuring that this Train Operator had received and understood instructions to shorten the absolute block, but the change did successfully help mitigate the consequences of this event.

The incoming train was on the route that had been provided by the Interlocking Operator to the polisher train, so there could have been a head-on collision if the polisher train had not stopped. If the polisher train had stopped at the signal at the end of the absolute block, it would have been within 20 feet of the other train on the same track.

After the Train Operator passed the red signal, K99-98, the Train Operator heard the Interlocking Operator contacting them and stopped the train. The train stopped approximately 475 feet past the signal.

Both the Interlocking Operator and Train Operator reported problems understanding radio transmissions in the yard.

Radio communications issues in the West Falls Church Yard had been reported in the past, but Metrorail had not taken effective steps to resolve these problems. The Office of Radio Communications repeatedly closed work orders that were opened stating that radio checks resulted in no defects found, and no repairs performed (See below for WMSC finding issued in April 2021 that requires Metrorail to address these yard radio system problems).

Probable Cause:

The probable cause of this event was Metrorail's lack of safety and supervisory oversight to effectively identify, act upon and mitigate known hazards such as radio system deficiencies in rail yards, and Metrorail's inadequate coordination between Interlocking Operators and the ROCC. Contributing to this event was Metrorail's insufficient training and supervisory oversight of interlocking operators and train operators.

Corrective Actions:

Following the WMSC's review of the initially submitted investigation report and associated feedback, WMATA is evaluating prevention methods and communication procedures that can be implemented between ROCC controllers and the West Falls Church Yard Interlocking Operator when unplanned trains are being sent into the yard in this area.

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

The Train Operator and Interlocking Operator received refresher training on radio communications.

WMSC staff observations:

In response to this event and other yard communication issues identified through the WMSC's regular oversight, the WMSC issued a finding requiring Metrorail to develop and implement a corrective action plan (CAP) to address radio system deficiencies in rail yard areas. The WMSC has approved this CAP for implementation.

Prior to issuing that finding, the WMSC performed radio checks in multiple locations, including those relevant to this investigation, that clearly identified radio system deficiencies. Metrorail's initial investigation of this event had stated that there were no radio reception issues. The WMSC is concerned about these post-event radio communications reports that do not appear to be fully focused on the continuous improvement process.

This event demonstrates the safety risks of a lack of complete communication and of poor coordination between interlocking operators and ROCC controllers, particularly at this unique location in the Metrorail system. ROCC controllers send trains to signals that they cannot see the status of when trains are entering the yard on this track. In this location, there is no diamond interlocking that would allow the train to cross from one track to another. Train movement observed in this event could lead to a head on collision. The ROCC allowed a train off the mainline to signal K99-100, while the Interlocking Operator was able to route a train to signal N91-44 at the same location in the opposite

direction on the same track. Communication is required to ensure safe train movement. Interlocking operators typically call the ROCC when trains are leaving the yard, but ROCC controllers do not always call an interlocking operator when trains are being sent into the yard. The signals entering the West Falls Church Yard from the Silver Line are automatic, so if a train operator sets a destination code for the rail yard, the train will receive signals allowing it to enter the yard as long as signal N91-44 is red. This allows trains to end up facing each other within just a few feet. The only prevention against this would be if ROCC set N91-44 lunar to allow a train to enter the mainline. When ROCC controllers set N91-44 as a lunar for entrance, there is no exit entry required. After the July 2020 Silver Spring derailment, ROCC management decided to activate this automatic feature rather than fleeting the switch. This location is different from other yard leads because there is only a single track and no switches or interlockings in the yard that are visible to ROCC controllers on their AIM screen. There is no way for ROCC to reliably identify whether there is a train coming out of the yard when ROCC controllers send a train up to signal K99-100. The Interlocking Operator should always contact a controller before sending a train out of this yard lead to ensure there is no incoming train in the other direction.

The WMSC continues to monitor the performance of Interlocking Operators as part of regular oversight activities.

In addition, Metrorail has an open CAP related to radio communications protocols. While there have been significant long-term improvements, additional improvements and careful supervisory oversight will be required even after the CAP is closed.

The investigation also demonstrated that the train was being operated above the regulated speed of 10 mph for operations over switches in rail yards. The train was moving 13 mph when it passed signal K99-98.

Staff recommendation: Adopt final report.

Washington Metro Area Transit Authority

Department of Safety and Environmental

Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E21042

Date of Event:	2/1/2021
Type of Event:	Red Signal Overrun
Incident Time:	10:55 hours
Location:	West Falls Church Yard, Signal K99-98
Time and How received by SAFE:	11:04 hours, SAFE On-Call Phone
WMSC Notification Time:	12:45 hours
Rail Vehicle:	Train ID 851 L2012.2013-3058.3059-2024.2025T
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20210202#91648MX

West Falls Church Yard – Red Signal Overrun

February 1, 2021

Table of Contents

Abbreviations and Acronyms

ARS	Audio Recording System
ATC	Automatic Train Control
ATCE	Automatic Train Control Engineering
ATP	Automatic Train Protection
CAP	Corrective Action Plan
CENV	Office of Vehicle Program Services
CMOR	Office of Chief Mechanical Officer
CMNT	Office of Car Maintenance
COMR	Office of Radio Communications
ER	Event Recorder
I/A	Incidents/Accidents
IIT	Incident Investigation Team
MC	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
TRST	Office of Track and Structures
VMS	Vehicle Monitoring System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

On Monday, February 1, 2021, at approximately 10:55 hrs., a West Falls Church Division Train Operator operating non-revenue Polisher Train ID 851 [L2012.2013-3058.3059-2024.2025T] overran Signal K99-98 displaying a red aspect in the West Falls Church Yard. The Rail Operations Control Center (ROCC) notified Department of Safety and Environmental Management (SAFE) at 11:04 hrs., that non-revenue Polisher Train was departing West Falls Church Yard to perform snow and ice-removal efforts when the unit overran Signal K99-98 (Red). The intended route had been previously set and Switch 91B was in the reverse position before the Red Signal Overrun, therefore causing no damage to the interlocking. SAFE, Office of Rail Transportation (RTRA) and Automatic Train Control (ATC) personnel responded to the scene. The Train Operator and Interlocking Operator were both removed from service by RTRA Management. No injuries were reported as a result of this incident.

Based on Audio Recording System (ARS) playback [radio and landline], the Train Operator requested an absolute block from the Interlocking Operator from Signal K99-74 to N91-44. The Interlocking Operator confirmed the request and later instructed the Train Operator to hold at Signal K99-98. The Train Operator did not acknowledge the instructions to hold at K99-98, the Interlocking Operator attempted to contact them a second time without success. As the Train Operator passed K99-98, the Interlocking Operator informed them again that they did not have a lunar at K99-98, to standby and to not move while ATC was contacted. ROCC, Office of Track and Structures (TRST) and SAFE were later notified of the incident.

The probable cause of the incident was insufficient communications between the Interlocking Operator and the Train Operator. The Interlocking Operator confirmed and set a permissive block to N91-44 as initially requested by the Train Operator and later changed the previously-granted permissive block without the proper acknowledgment from the Train Operator. The shorter permissive block was not acknowledged by the Train Operator and the Interlocking Operator did not ensure 100% repeat back was not conducted as required by General Rule 1.79.

Upon report of a red signal overrun, SAFE conducted a preliminary 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), Train Operator was not in compliance with the following Operating Rules:

- 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 ROCC or the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1."*

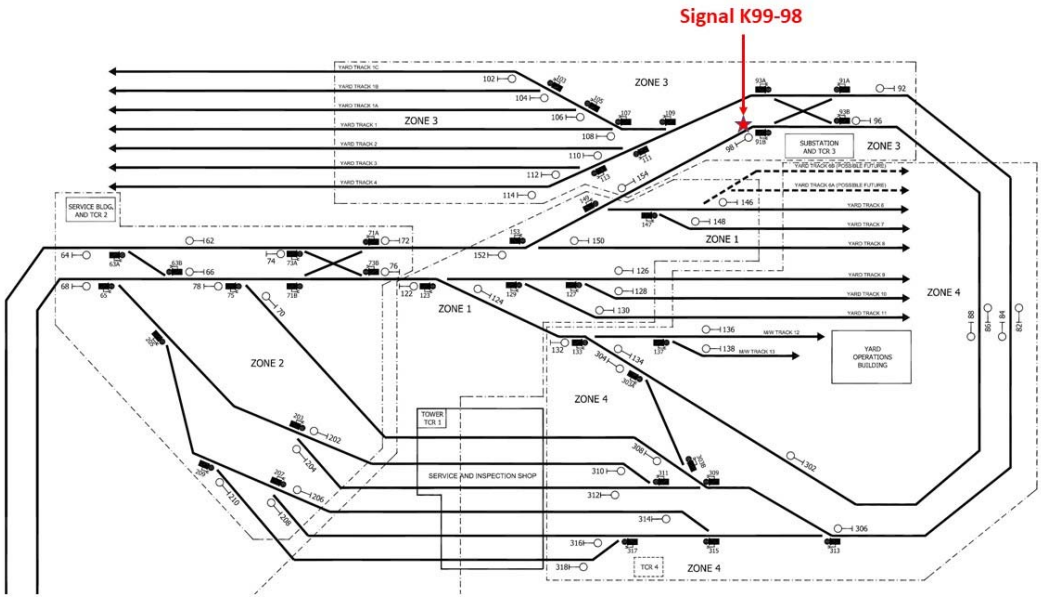
- General Rule 1.79 – *Personnel shall not take any action until they are positive that all radio transmissions or receptions are heard, fully understood, and acknowledged. Individual radio transmissions shall, at all times, be repeated by the receiver so the transmitter can confirm the message was received 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."*

- General Rule 1.46 – *Employees shall not permit unnecessary conversation, reading, lounging or any other action or condition of mind to divert their attention from the safe and efficient performance of duty.*

Incident Site

West Falls Church, Signal K99-98

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 – SAFE interviewed two individuals as part of this investigation. Interviews include persons present at, during, and after the incident, those directly involved in the response process, and representatives from the Washington Metrorail Safety Commission (WMSC). SAFE interviewed the following 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
    - Metrorail Safety Rules and Procedures Handbook (MSRPH)
    - National Oceanic and Atmospheric Administration (NOAA)
    - Maximo Data

- System Data Recording Review – Collection of information contained in Metro Data Recording Systems. This data includes:
    - ARS playback [Radio and Landline Communications]
    - The Office of Chief Mechanical Officer (CMOR) Incident Investigation Team (IIT) Vehicle Monitoring System (VMS)

Investigation

Based on findings, at approximately 10:55 hrs., a West Falls Church Division Train Operator operating non-revenue Polisher Train ID 851 [L2012.2013-3058.3059-2024.2025T] overran Signal K99-98 displaying a red aspect in the West Falls Church Yard. Train ID 851 was occupied with Train Operators on both ends. The first Train Operator was instructed to proceed to K99-62 and key down with the assignment to polish rails. The second Train Operator was given a block from K99-74 to N91-44. According to the Interlocking Operator's Incident Report, the Interlocking Operator instructed the Train Operator to hold at Signal K99-98 (Red) due to an incoming train. The Train Operator did not acknowledge the directions given by the Interlocking Operator and proceeded to N91-44. After the Train Operator passed Signal K99-98 (Red), they acknowledged the Interlocking Operator's attempt to contact them and stopped the train approximately 475 feet past Signal K99-98.

Chronological Audio Recording System (ARS) Timeline

ARS playback revealed the Train Operator of Train ID 851 was granted an absolute block from the Interlocking Operator from Signal K99-74 to N91-44. The Interlocking Operator confirmed the lead to N91-44. At approximately 10:55:50 hrs., the Interlocking Operator instructed the Train Operator to hold at Signal K99-98. The Train Operator did not acknowledge the instructions to hold at K99-98 and the Interlocking Operator attempted to contact the Train Operator a second time. At approximately 10:57:11 hrs., the Interlocking Operator attempted to contact the Train Operator once more. The Train Operator subsequently conducted radio checks as the transmissions were not clear. The Interlocking Operator informed the Train Operator Signal K99-98 was not lunar and they passed a red signal. Train Operator was then instructed to standby and not move their train.

Time	Description
10:52:28 hrs.	Interlocking Operator: Instructed Train Operator of Train ID 851 that they had a lunar K99-130, absolute block K99-62 (Red), key down and reverse
10:52:39 hrs.	Train Operator: Affirmed and stated they had no one onboard on the train. [Radio]
10:52:43 hrs.	Interlocking Operator: Informed Train Operator of Train ID 851 they were going to polish the rails; how do you copy? [Radio]
10:52:48 hrs.	Train Operator: Asked Interlocking Operator to repeat the last transmission. [Radio]
10:52:50 hrs.	Interlocking Operator: Stated, you are going to polish the rails; how do you copy, over. [Radio]
10:52:56 hrs.	Train Operator: Stated they affirmed, polishing the rails. Moving on my lunar at K99-130, absolute block K99-54 reverse behind 74, over. [Radio]
10:53:08 hrs.	Interlocking Operator: Stated yes, you got it. [Radio]
10:55:25 hrs.	Interlocking Operator: Instructed Train Operator of Train ID 851 they could key down. [Radio]
10:55:36 hrs.	2nd Train Operator: Stated, picking up at lunar K99-74 absolute to no closer than 10, N91-44 contact. [Radio]
10:55:50 hrs.	Interlocking Operator: Instructed Train Operator of Train ID 851 to hold at K99-98. [Radio]
10:56:04 hrs.	Interlocking Operator: Asked Train Operator of Train ID 851 if they copy to hold at K99-98. [Radio]
10:57:11 hrs.	Interlocking Operator: Attempted to contact Train Operator of Train ID 851. [Radio]
10:57:31 hrs.	2nd Train Operator: Asked Interlocking Operator if they can hear their transmissions and conducted a radio check. [Radio]
10:57:36 hrs.	Interlocking Operator: Informed Train Operator of Train ID 851 they did not have a lunar at 98, they had a red signal at 98, standby while they contact ATC, how do you copy over do not move. [Radio]

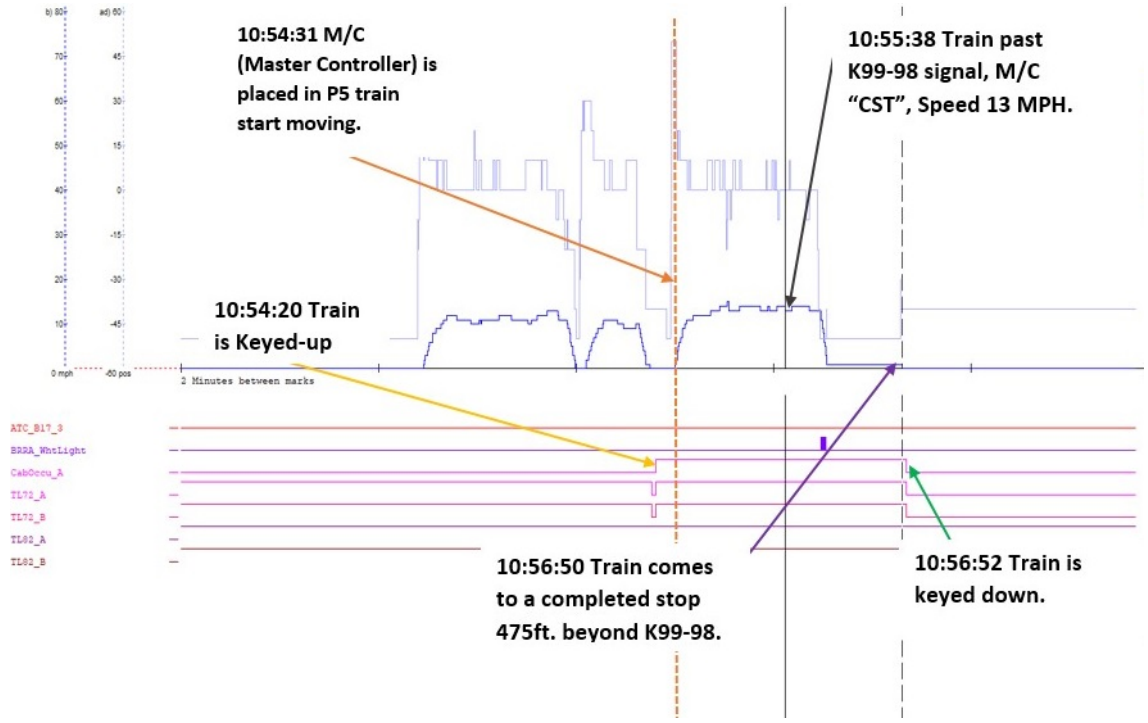
Office of Chief Mechanical Officer (CMOR) / Incident Investigation Team (IIT)

Event Recorder (ER) Data Graph/Sequence of Events

Based on IIT CMOR analysis, Train ID 851 keyed up at 10:54:20 hrs. in the direction of Signal K99-98. Train Operator placed the Master Controller (MC) in the P5 (power) position and started moving. At approximately 10:55:28, the train passed Signal K99-98 with the MC in the "CST" position at 13 mph. Train ID 851 came to a complete stop 475 feet beyond Signal K99-98, displaying a red aspect. Details from the data analysis are as follows:

Time	Description
10:54:20 hrs.	Lead car 2012 keyed up in the direction of Signal K99-98.
10:54:31 hrs.	MC placed in P5; train starts moving.
10:55:03 hrs.	MC moved to B2 BRAKE position, 717 feet from Signal K99-98, traveling at a speed of 14 mph.
10:55:04 hrs.	MC moved to CST position, 699 feet from Signal K99-98, traveling at a speed of 15 mph.
10:55:05 hrs.	MC moved to BRAKE position, 671 feet from Signal K99-98, traveling at a speed of 13 mph.
10:55:06 hrs.	MC moved to CST position, 661 feet from Signal K99-98, traveling at a speed of 13 mph.
10:55:34 hrs.	MC moved to B1 BRAKE position, 98 feet from Signal K99-98, traveling at a speed of 14 mph.
10:55:35 hrs.	MC moved to CST position, 76 feet from Signal K99-98, traveling at a speed of 15 mph.
10:55:38 hrs.	Train ID 851 passed Signal K99-98, MC in CST position, train speed 13 mph.
10:55:51 hrs.	MC moved to B1 BRAKE position, 278 feet after Signal K99-98, traveling at a speed of 14 mph.
10:55:53 hrs.	MC moved to CST position, 309 feet after Signal K99-98, traveling at a speed of 14 mph.
10:55:59 hrs.	MC moved to B5 BRAKE position, 435 feet after Signal K99-98, traveling at a speed of 13 mph.
10:56:50 hrs.	Train ID 851 came to a complete stop after traveling 475 feet beyond Signal K99-98.
10:56:52 hrs.	Train is keyed down.

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



Graph #1 – Office of Vehicle Program Services (CENV) reported no propulsion or brake faults were observed that could have contributed to the incident.

Automatic Train Control Engineering (ATCE)

The preliminary ATCE analysis revealed that Signal K99-98 was displaying a red aspect as Train ID 851 traversed the interlocking.

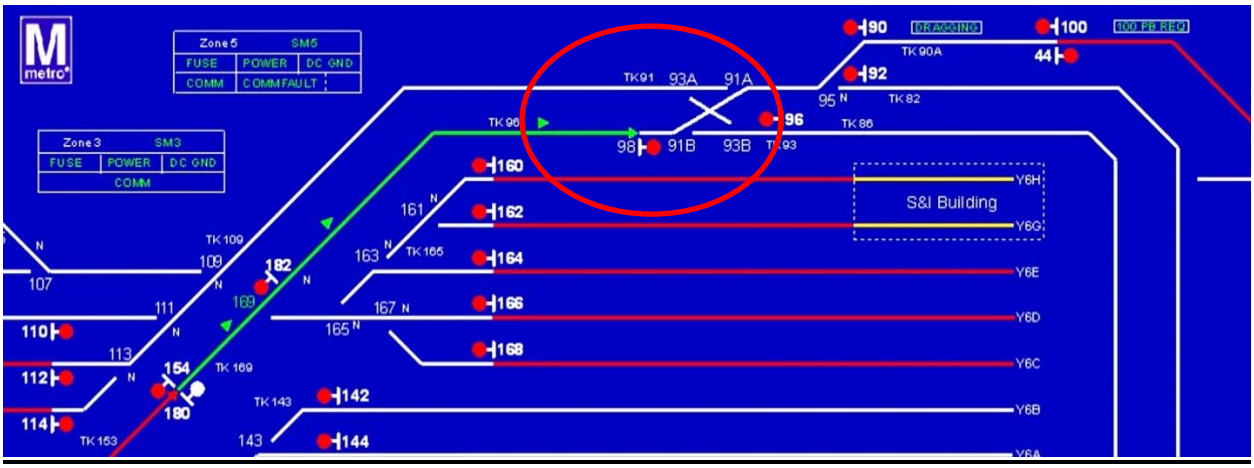


Diagram #1 – Graphical playback depicts the Train Operator had a red signal at K99-98 when they passed it.

Office of Radio Communications (COMM)

COMM personnel performed radio checks in the West Falls Church Yard at Signal 44 and Signal 74 for the radio reception problem. All tests passed with satisfaction and COMM personnel determined the radio reception problem was due to operator error.

Office of Car Maintenance (CMNT)

CMNT personnel performed CENV recommendations to this incident which included complying with Special Instruction Procedure (SIP) G004. CMNT personnel found no trouble; all tests passed with satisfaction. CMNT personnel performed a Daily Inspection (DI) and determined the train was good for service. Below were the recommendations from CENV to CMNT:

1. Perform SIP-G004, Inspection Requirements for Class 1 Rail Vehicles that Overran a Red Signal, prior to release back to service.
2. Check propulsion.

Interview Findings

Based on the investigation launched into the red signal overrun incident, SAFE conducted two interviews via Microsoft Teams, which included the investigation team, relevant Metro management and representatives from the WMSC. The interviews conducted identified the following key findings associated with this event:

The Train Operator stated the West Falls Church Yard has known communication problems that have been reported by train operators in the past. Train Operator added this issue still remains unresolved.

The Interlocking Operator stated there were no distractions in the tower while the incident occurred; however, the Interlocking Operator was heard via ARS having a private conversation while talking with the incident Train Operator. The Interlocking Operator also reported a communication issue within the West Falls Church Yard.

Upon further investigation, there have been several work orders created by COMM in which radio testing were performed and all radio checks resulted in no defects found. No repairs were performed.

Findings

- Train ID 851 was a non-revenue service consist going out as a Polisher Train.
- Train Operator exceeded the 10 mph speed limit. (The maximum authorized speed in yards is 15 mph, except curves, switches, roadway crossings and storage tracks entrances, which require a 10 mph maximum speed.)
- Radio transmissions were not clear between the Interlocking Operator and the Train Operator.
- The Train Operator moved their train consist past a red signal without permission from the Interlocking Operator. This action was not in compliance with MSRPH 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 ROCC or the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1.”
- The Interlocking Operator did not ensure their instructions were 100% received by the Train Operator. This action was 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."*

- The Interlocking Operator was having a private telephone conversation and giving directions to the Train Operator simultaneously. This action was not in compliance with MSRPH General Rule 1.46 – *Employees shall not permit unnecessary conversation, reading, lounging or any other action or condition of mind to divert their attention from the safe and efficient performance of duty.*

Weather

At the time of the incident, NOAA recorded the temperature at 32° F, winds SW at 18 mph, light freezing rain, ice and fog with visibility of 3 miles. Weather was not a contributing factor in this incident (Weather source: NOAA – Location: Falls Church, VA.)

Human Factors

Fatigue

Based on SAFE's interview questions related to Fatigue Factors and review of the Train Operator's and Interlocking Operator's 30-day work history, it was determined, the Train Operator's and Interlocking Operator's 30-day work schedules leading up to the incident were 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 the formal interviews, no personal factors were disclosed that 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's post-incident testing results, SAFE determined the employee complied with the Drug and Alcohol Policy and Testing Program 7.7.3/6.

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

Immediate Mitigation to Prevent Recurrence

- RTRA removed the Train Operator and Interlocking Operator from service for post-incident toxicology testing.
- RTRA removed the incident consist from service for CMNT inspection and CENV analysis.

Probable Cause Statement

The probable cause of the incident was insufficient communications between the Interlocking Operator and the Train Operator. The Interlocking Operator confirmed and set a permissive block to N91-44 as initially requested by the Train Operator and later changed the previously-granted permissive block without the proper acknowledgment from the Train Operator. The shorter permissive block was not acknowledged by the Train Operator and the Interlocking Operator did not ensure 100% repeat back was not conducted as required by 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
91648_SAFECAPS_RTRA_001	Schedule and ensure the Train Operator and Interlocking Operator complete refresher training on General Rule 1.79 and other relevant radio communication training.
91648_SAFECAPS_RTRA_002	RTRA Management to produce a Lessons Learned and distribute throughout department.
91648_SAFECAPS_RTRA_003	RTRA and ROCC to evaluate prevention methods to eliminate potential for alignment of trains out of the West Falls Church Yard towards the N-Line when trains are inbound towards the Yard from N91.
91648_SAFECAPS_ COMM_003	Provide SAFE common radio reception issues experienced by operator error as noted in the report. Partner with SAFE on developing a safety bulletin that identifies common radio issues where operator error is the cause and how to avoid these issues in the future.

Appendix A – Interview Summaries

Train Operator

This employee is a WMATA Train Operator with five years of experience as a Train Operator and one and a half years of service as a Bus Operator. The Train Operator's last certification was in October 2019 and they have no history of sleep issues to report.

Based on the SAFE interview, the Train Operator reported they was operating a train with another train operator on the opposite end. The Train Operator stated they were given a lunar at Signal K99-74 with permission to proceed to Signal N91-44. The Train Operator reported their assignment was to polish rails with the deicer train. As the Train Operator began to proceed N91-44, they reported the Interlocking Operator contacted them on the radio and stated they did not have a lunar at Signal K99-98. The Train Operator reported they did not hear the Interlocking Operator attempting to contact them and proceeded with the last transmission received. Train Operator stated there were no distractions at them time of the incident; however, it was starting to snow. Train Operator reported they think bad communications in the West Falls Church Yard contributed to this incident and there was not anything they could have done to prevent it from occurring. Train Operator stated the radio transmitting issue has been reported to management.

Interlocking Operator

This employee is a WMATA Interlocking Operator with eight years of experience as an Interlocking Operator, one year of service as a Station Manager, seven years of service as a Train Operator and five years of service as a Bus Operator. The Interlocking Operator's last certification was in June 2020 and they have no history of sleep issues to report.

Based on the SAFE interview, the Interlocking Operator reported they gave the Train Operator a lunar at Signal K99-74 to Signal N91-44. As the Train Operator of Train ID 851 was traveling, the Interlocking Operator reported there was another train in the yard conducting a move and they instructed the Train Operator of Train ID 851 to hold at Signal K99-98. The Interlocking Operator stated the Train Operator did not respond and they attempted to contact them a second time. The Interlocking Operator reported they could not understand the radio traffic coming in and there have been radio communication issues reported in the recent past regarding the West Falls Church Tower. Once positive radio communications were established, the Interlocking Operator reported they instructed the Train Operator to hold their position as they were supposed to hold at Signal K99-98. The Interlocking Operator stated they have experienced radio communication issues and reported them; however, the radio communication continues to be spotty in the West Falls Church Tower. The Interlocking Operator stated there was nothing they think they could have done to prevent this incident from occurring.

Appendix B – Incident Photos

Photo #1 – Train ID #851, approximately 475 feet past Signal K99-98 (Red).

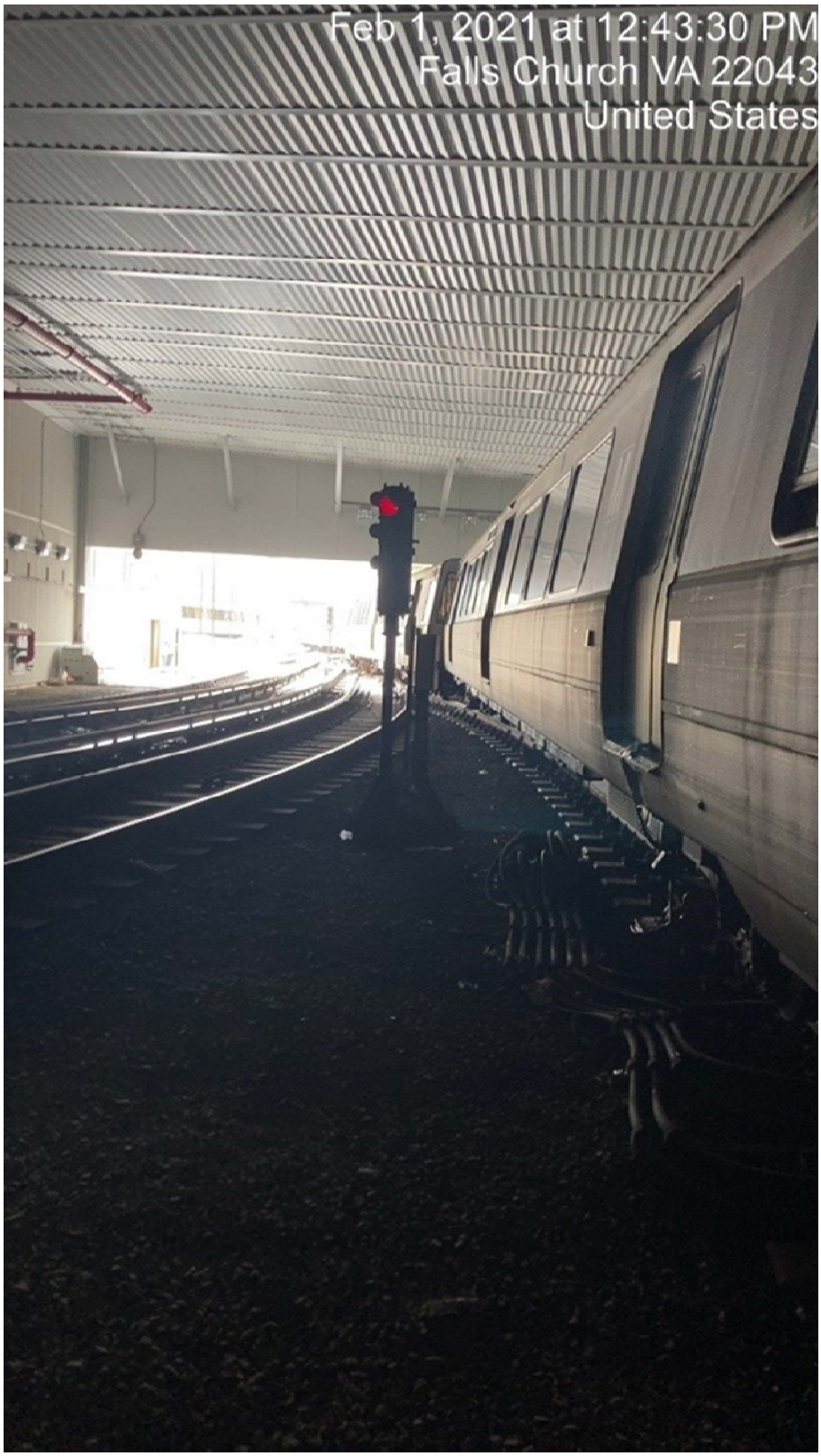
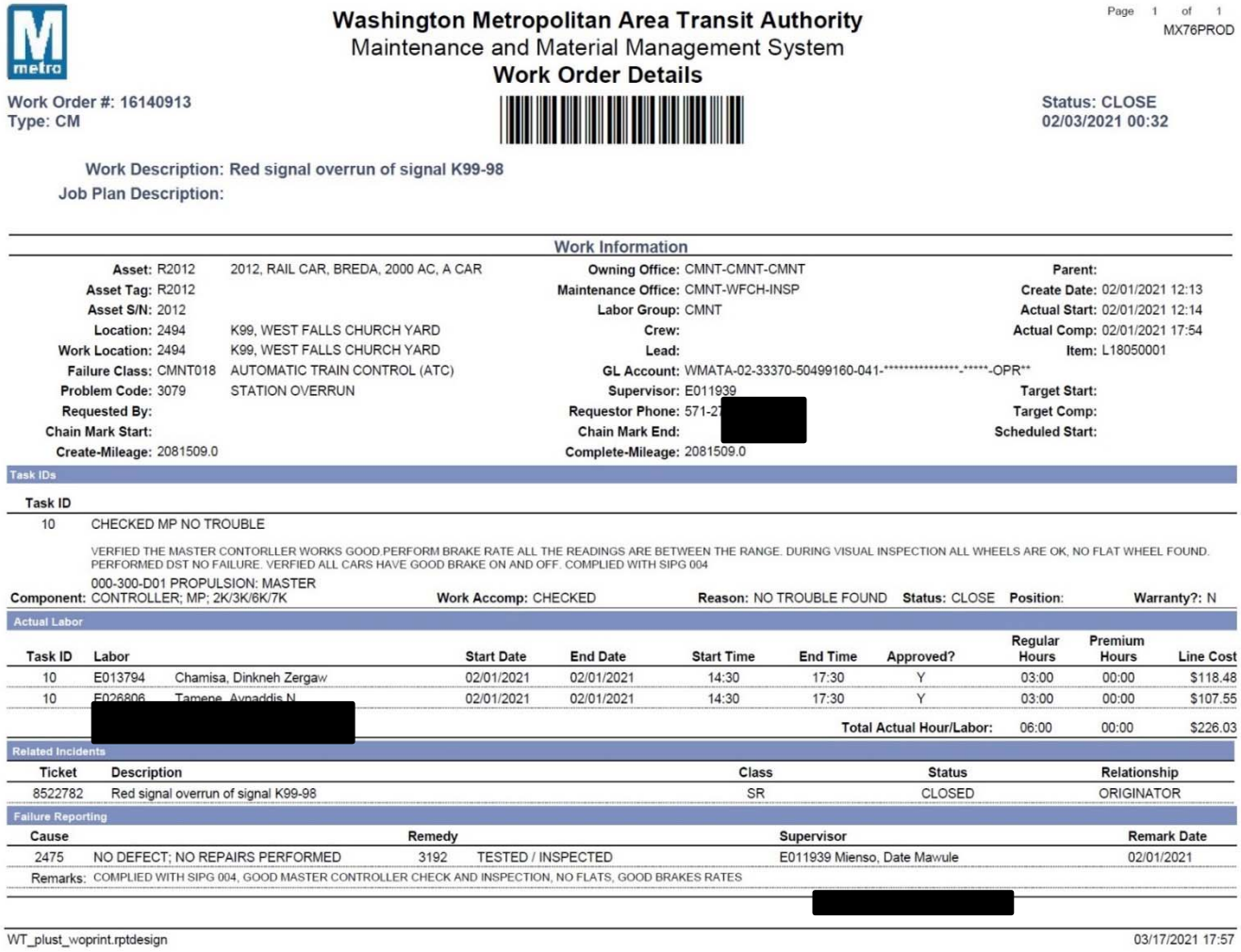


Photo #2 – Train ID #851, approximately 475 feet past Signal K99-98 (Red) [View from lead car].

Appendix C – Maximo Data

Office of Car Maintenance (CMNT) Work Order



Washington Metropolitan Area Transit Authority
Maintenance and Material Management System
Work Order Details

Page 1 of 1
MX76PROD

Work Order #: 16140913
Type: CM

Status: CLOSE
02/03/2021 00:32

Work Description: Red signal overrun of signal K99-98
Job Plan Description:

Work Information

Asset:	R2012 2012, RAIL CAR, BREDA, 2000 AC, A CAR	Owning Office:	CMNT-CMNT-CMNT	Parent:	
Asset Tag:	R2012	Maintenance Office:	CMNT-WFCH-INSP	Create Date:	02/01/2021 12:13
Asset S/N:	2012	Labor Group:	CMNT	Actual Start:	02/01/2021 12:14
Location:	2494 K99, WEST FALLS CHURCH YARD	Crew:		Actual Comp:	02/01/2021 17:54
Work Location:	2494 K99, WEST FALLS CHURCH YARD	Lead:		Item:	L18050001
Failure Class:	CMNT018 AUTOMATIC TRAIN CONTROL (ATC)	GL Account:	WMATA-02-33370-50499160-041-**********-*****-OPR**		
Problem Code:	3079 STATION OVERRUN	Supervisor:	E011939	Target Start:	
Requested By:		Requestor Phone:	571-2[redacted]	Target Comp:	
Chain Mark Start:		Chain Mark End:		Scheduled Start:	
Create-Mileage:	2081509.0	Complete-Mileage:	2081509.0		

Task IDs

Task ID	
10	CHECKED MP NO TROUBLE

VERFIED THE MASTER CONTORLLER WORKS GOOD.PERFORM BRAKE RATE ALL THE READINGS ARE BETWEEN THE RANGE. DURING VISUAL INSPECTION ALL WHEELS ARE OK, NO FLAT WHEEL FOUND. PERFORMED DST NO FAILURE. VERFIED ALL CARS HAVE GOOD BRAKE ON AND OFF. COMPLIED WITH SIPG 004

000-300-D01 PROPULSION: MASTER
Component: CONTROLLER; MP; 2K/3K/6K/7K **Work Accomp:** CHECKED **Reason:** NO TROUBLE FOUND **Status:** CLOSE **Position:** **Warranty?:** N

Actual Labor

Task ID	Labor		Start Date	End Date	Start Time	End Time	Approved?	Regular Hours	Premium Hours	Line Cost
10	E013794	Chamisa, Dinkneh Zergaw	02/01/2021	02/01/2021	14:30	17:30	Y	03:00	00:00	$118.48
10	E026806	Tamene, Aynaddis N	02/01/2021	02/01/2021	14:30	17:30	Y	03:00	00:00	$107.55
	[redacted]						Total Actual Hour/Labor:	06:00	00:00	$226.03

Related Incidents

Ticket	Description	Class	Status	Relationship
8522782	Red signal overrun of signal K99-98	SR	CLOSED	ORIGINATOR

Failure Reporting

Cause		Remedy		Supervisor	Remark Date
2475	NO DEFECT; NO REPAIRS PERFORMED	3192	TESTED / INSPECTED	E011939 Mienso, Date Mawule	02/01/2021

Remarks: COMPLIED WITH SIPG 004, GOOD MASTER CONTROLLER CHECK AND INSPECTION, NO FLATS, GOOD BRAKES RATES

[redacted]

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Document #1 – CMNT Maximo Work Order #16140913 detailing inspections conducted.

Page 1 of 1
MX76PROD

Washington Metropolitan Area Transit Authority
Maintenance and Material Management System
Work Order Details

Work Order #: 16224145
Type: CM

Status: CLOSE
03/17/2021 23:15

Work Description: K99, SAFE REQUEST CRCS RADIO CHECK @ K99 SIGNAL 44& 74
Job Plan Description:

Work Information

Asset: 60075	RADIO, CRCS, WEST FALLS CHURCH YARD K99, K96	**Owning Office:** COMM-TSSM-RADO		**Parent:**	
Asset Tag:		**Maintenance Office:** COMM-TSSM-RADO		**Create Date:**	03/17/2021 21:01
Asset S/N: CRCSK96		**Labor Group:** COMMR3RADO		**Actual Start:**	03/17/2021 21:11
Location: 2649	K96, WEST FALLS CHURCH YARD, BUILDING (B) TOWER, 2ND FLOOR, ROOM 2-7, COMMUNICATIONS ROOM	**Crew:**		**Actual Comp:**	03/17/2021 21:11
Work Location:		**Lead:** E014279		**Item:**	N60040084
Failure Class: COMR003	RADIO COMMUNICATIONS SYSTEMS	**GL Account:** WMATA[redacted]0499280-042-**********-*****-OPR**			
Problem Code: 3669	COMMS FAILURE	**Supervisor:**		**Target Start:**	
Requested By: SAFE		**Requestor Phone:** 202/805-3865		**Target Comp:**	
Chain Mark Start:		**Chain Mark End:**		**Scheduled Start:**	
Create-Mileage: 0.0		**Complete-Mileage:** 0.0			

Task IDs

Task ID	
10	SEE DESCRIPTION

3075 AND 387 RESPONDED TO RADIO CHECK AT K99 WEST FALLS CHURCH YARD AT SIGNAL 44 AND 74.
PERFORMED CRCS RADIO CHECK AT K99 YARD SIGNALS 44 AND 74 AND ALL TEST CAME BACK LOUD AND CLEAR.

Component: **Work Accomp:** **Reason:** **Status:** CLOSE **Position:** **Warranty?:** N

Actual Labor

Task ID	Labor		Start Date	End Date	Start Time	End Time	Approved?	Regular Hours	Premium Hours	Line Cost
10	E007838	Feh, James K	03/17/2021	03/17/2021	19:00	22:00	Y	03:00	00:00	$122.02
10	E014642	Ido, Yilma Seyoum	03/17/2021	03/17/2021	19:00	22:00	Y	03:00	00:00	$118.48
							Total Actual Hour/Labor:	06:00	00:00	$240.50

Failure Reporti[redacted]

Cause		Remedy		Supervisor	Remark Date
2771	RADIO RECEPTION PROBLEM	2477	NO DEFECT; OPERATOR ERROR		

Remarks:

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Document #1 – COMR Maximo Work Order #16224145 detailing radio checks conducted.

Appendix D – Automatic Train Control Engineering (ATCE) Report

	Washington Metropolitan Area Transit Authority ENGA-ATCE	***Request:***	**K99 - 02-01-2021**
		Date:	**2/8/2021**
		From:	[redacted]
		To:	[redacted]

REPORTED DATA	K99 Yard	2/01/21	Time:	10:56	Train ID:	851	
Description:	Train 851 Red Signal Overrun - K99-Signal-98		**Interlocking Control:**		Local		
REQUESTED ANALYSIS	Investigate Incident						

INITIAL STATES AS OF *10:47:55*

Name	STATE	AUTO	Name	STATE	AUTO	Name	Position
K99 Signal 98	Clear	Control				**K99 Switch 91B**	Reverse
K99 Signal 90	Clear	Control				**K99 Switch 91A**	Reverse
						K99 Switch 95	Reverse

RECORDED EVENT DATA

TIME	EVENT	COMMENT
10:47:55	K99 Interlocking Control Local	K99 Interlocking is set to Local Control
10:48:55	SW-91A & SW91B Indicate Reverse	A route is set from signal 150 to 90 with switches 91A 91B set for a reverse move. Switch 91B is indicated locked for reverse move. At this time signal 98 is set to Clear for reverse move through the interlocking.
10:47:55	SW-91B Indicating locked	
10:47:55	Signal-98 is Controlled Clear	
10:47:58	Route from Signal 98-90 is Control Clear	
10:49:14	Signal-98 Is Controlled Stop	No move is made through the interlocking. Route through signal 98-90 is set to Stop and the route is removed. At 10:50:51, the route is set again. Signal is set to Stop. Track circuit through 96AT is unlocked. At 10:54:41 an N91 train approaches signal 100 and stopped at signal 100. At 10:55:48, is goes to stop. Route from signal 98-90 is cancelled. Signal 100 still remains red. All route through the interlocking is stopped. Train occupied TRK- 96T at 10:56:40 and approached signal 98 which was still set to stop (RED).
10:49:16	Route from Signal 98-90 is stopped	
10:49:20	96AT is Controlled Unlocked	
10:50:51	Route 150 – 90 is Controlled Set	
10:53:55	Train approaches signal-100 from N91	
10:54:41	Signal 100 goes to Stop	
10:55:48	Signal 98 Indicates Stop.	
10:56:40	TK-96 Track Circuit is occupied	
10:56:50	OS-93 Track Circuit is occupied	Signal 98 is overrun well into signal 90 and 92

Document #1 – ATCE Investigative Incident Analysis.

Appendix E – Lessons Learned

Office of Rail Transportation

Lessons Learned

RTRA OFFICE OF RAIL TRANSPORTATION

metro

Looking back, to effectively move forward

February 19, 2021
Number: 2021-002

West Falls Church Division –Red Signal Overrun

INCIDENT SUMMARY

On Monday, February 1, 2021, at approximately 11:00am, there was a red signal overrun at West Falls Church Yard. The train involved overran signal K99-98 en route to mainline for rail polishing duty.

ROOT CAUSES

The Interlocking Operator is heard giving the following instructions to the Train Operator 'with that lunar at K99-74, you have permission up to N91-44". The Interlocking Operator is heard having a personal conversation with two individuals on the telephone and the Train Operator can be heard saying "Roger with this lunar at K99-74, I have permission up to N91-44 and contact". The Interlocking Operator realizes that a train is requesting to enter the yard at K99-100 signal and wants the first train to hold at K99-98 signal. Those instructions can be heard twice with no response from the train moving towards N91-44 signal. The Interlocking Operator then pulls the lunar at K99-98 without first getting an acknowledgement from the Train Operator that he is stopped. At that time the Interlocking Operator ends the personal phone conversation. Furthermore, it's obviously a case of failed radio protocols, inattentiveness and professionalism.

RULES VIOLATED

MSRPH 1.46 Employees shall not permit unnecessary conversation, reading lounging or any other action or condition of mind to divert their attention from the safe and efficient performance of duty.

MSRPH 1.69 Employees shall use WMATA communications equipment in compliance with Federal Communications Commission Rules and Regulations, and in compliance with WMATA Rules Procedures and General Notices.

MSRPH 1.71 Authority telephones and radios shall be used only for official WMATA business and call preference shall be given to business pertaining to train operations or emergencies.

MSRPH 1.79 Employees 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 be repeated by the receiver so the transmitter can confirm the message was received completely and by the intended receiver.

MSRPH 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, 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.

What happened…	*What should have happened…*
The Interlocking Operator pulled a lunar signal on a train moving towards K99-98 signal prior to receiving confirmation that the train was stopped.	The Interlocking Operator should have not taken any action until they are positive that all radio transmissions were received and acknowledged.
The Interlocking Operator did not give an Absolute Block or get a repeat back prior to initiating train movement.	The Train Operators involved should have repeated back the entire instruction given by the Interlocking Operator.
The Interlocking Operator was utilizing an Authority telephone phone for unofficial WMATA business.	The Interlocking Operator should have been more attentive to the train movement that was taking place under their prevue and control.
There were unnecessary communications while the train operators were being instructed by the Interlocking Operator.	There should have been no unnecessary communications during instruction of yard movement so as to divert attention from safe and efficient performance of duties.

RECOMMENDATIONS

Due to the nature of this incident where multiple rule infractions occurred:

- ✓ Ensure that all operational personnel comply with all Operational Rules especially Cardinal Operating Rules;
- ✓ Stress the importance of not allowing a train to move closer than 10 feet of a red signal;
- ✓ Interlocking Operators must receive a complete repeat back from receiver of instructions given.
- ✓ Always follow Rules/Procedures outlined in WMATA's MSRPH and Interlocking Operator Manual.
- ✓ Avoid unnecessary communications in the performance of your duties.