



WMSC Commissioner Brief: W-0089 – Red Signal Overrun – Eastern Market Station – December 15, 2020

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

Safety event summary:

The Train Operator of an employee train (used to bring station managers to their posts just prior to the Metrorail system opening for revenue service) reversed ends at Eastern Market Station and then moved the train, without authorization, back in the direction of Largo Town Center past red signal D06-02. The train stopped approximately 9 feet beyond the red signal at the Eastern Market Interlocking.

The operator had performed the same task several days in a row and had always had a lunar (proceed) signal each time they reversed ends at this location. In this case, the signal was red to protect Roadway Maintenance Machines (RMMs) moving in that area after completing overnight work.

On this day, the Train Operator had stopped the train 103 feet into the Eastern Market Station platform on Track 1 at approximately 4:45 a.m. The train had moved through the interlocking from Track 2 to Track 1 before entering the station.

At 4:49 a.m., the Train Operator keyed up (turned on) Train 422 at the opposite end of the consist and began moving back toward Largo Town Center Station.

The Train Operator told the ROCC controller on the radio that they had a lunar (proceed signal) and were on the move, the ROCC controller asked that the message be repeated, and the Train Operator said to disregard. In an interview, the operator stated they said disregard after noticing that the signal was red and applying the brakes. Approximately 30 seconds later, the ROCC controller asked the Train Operator for their location, and the Train Operator stated that they were holding at signal D06-02. The Train Operator responded that they were at the platform end gate when asked if they were properly berthed at Eastern Market Station.

Approximately two minutes later, a different ROCC employee told the controller to look at their alarms that showed the train had passed a red signal.

The train reached a top speed of 7 mph as it moved 171 feet, stopping 9 feet beyond signal D06-02, which was red. The signal is near the end of the station platform.

When asked if the train was in the interlocking and whether the train had passed the red signal, the Train Operator acknowledged that the train had moved beyond the red signal.

Due to the location of the train at the interlocking, rail service was suspended in the area for approximately 30 minutes.

Approximately 10 minutes after the red signal overrun was identified, the ROCC Assistant Superintendent notified Metrorail's Safety Department of the safety event.

Metrorail did not document the scene of this event prior to moving the train, despite having personnel on scene specifically to identify the location of the train relative to the interlocking and switches.

Vehicle Monitoring System (VMS) data was incomplete due to the vehicle's Automatic Train Control (ATC) system not communicating with the ATC wayside equipment, however the data regarding speed and movement was able to be



overlayed on the location of movement based on other information available during the course of the investigation. These communication issues appear to relate only to data collection and storage.

Additional information related to the operator's specific actions is not available because 3000 Series cars do not have inward or outward facing audio or video recording devices.

3000 Series cars do not have any protection against movement without speed commands, since they do not have the "Stop and Proceed Mode" that is on the 7000 Series cars and that is being installed on other cars in the fleet.

The Train Operator had a long layoff between classroom training and practical training, and had only been certified as a train operator for approximately one month at the time of this event. Metrorail identified several safety events in this same time period that involved train operators with less than three years of experience.

Probable Cause:

The probable cause of this event was Metrorail's continued failure to fully implement sufficient protections against the unauthorized movement of trains with zero speed commands. Contributing to this event is Metrorail's insufficient training, oversight and procedures to ensure adequate situational awareness.

Corrective Actions:

Metrorail has open Corrective Action Plans (CAPs) related to red signal overruns, station overruns, and insufficient protections against the unauthorized movement of trains with zero speed commands that include steps that may address issues related to this investigation such as a safety stand down, the reinstatement of Metrorail's follow up training for train operators in the first three months after certification, additional check rides, another review of signal visibility, and consideration of alternative fail-safe measures to stop trains that pass red signals. In the approximately six months since the safety stand down held soon after this event and a number of other red signal overruns in late 2020, Metrorail has reported one red signal overrun.

Car 3066 VMS required ATC communication fixes.

Cars 3066-67 required fixes due to only one feedback signal package communicating with VMS.

Cars 3066-67 required fixes due to propulsion not communicating with VMS.

Trailing cars 3086 and 3087 required the same fixes.

The Train Operator completed refresher training the week after this event.

WMSC staff observations:

Metrorail has an open Corrective Action Plan (CAP) related to protections against unauthorized movement of trains with zero speed commands. WMSC staff have also discussed other potential improvements that WMATA may want to consider to existing stop and proceed functions.

While the train identification number in this event was 422, normally a number used for revenue operations, the employee trains that run before the system opens are not in revenue service for customers.



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While the ROCC generally moved quickly and effectively to respond to this event, there were instances of unclear or inconsistent communication such as the location of the service suspension and need for shuttle buses.

Staff recommendation: Adopt final report.



Washington Metro Area Transit Authority

Department of Safety and Environmental Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I 20492

Date of Event:	12/15/2020
Type of Event:	Red Signal Overrun
Incident Time:	04:49 hrs.
Location:	Eastern Market Station, D06-02 Red Signal, Track 1
Time and How received by SAFE:	05:03 hrs. – SAFE On-Call Phone
WMSC Notification Time:	05:56 hrs.
Rail Vehicle:	Train ID 422 L3087-3086.3060-3061.3067-3066T
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20201215#90774MX

**Eastern Market Station – Red Signal Overrun
December 15, 2020**

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ABBREVIATIONS AND ACRONYMS

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

EXECUTIVE SUMMARY

On Tuesday, December 15, 2020, at approximately 04:49 hrs., the Train Operator of Train ID 422, an employee train 6-car 3000 Series consist, comprised of L3087-3086.3060-3061.3067-3066T, operating in the direction of Largo Station, overran Eastern Market Station, Track 1, signal D06-02 displaying a red aspect. Per the Audio Recording System (ARS), at approximately 05:01 hrs., the Rail Operations Control Center (ROCC) suspended train service between Federal Center SW Station and Stadium-Armory Station. The ROCC requested a shuttle bus service to minimize the impact to customer service. The ROCC informed and dispatched all appropriate personnel to Eastern Market Station.

Based on ARS playback, the ROCC Radio Rail Traffic Controller (RTC) contacted Train ID 422 Train Operator on Ops 2 and asked if their train was at the Eastern Market Station interlocking, Track 1. Train ID 422 Operator responded, affirmative. Radio RTC responded to Train ID 422, "Are you confirming you proceeded to pass the D06-02 signal displaying a red aspect?" Train ID 422 Operator responded, affirmative.

The Advanced Information Management System (AIMS) playback showed Train ID 422 berthed at Eastern Market Station platform, Track 1, then moved in the direction of Largo Station and past signal D06-02 displaying red aspects. (See AIMS Playback Illustrations 1 through 4).

Based on Vehicles Program Services (CENV) data analysis utilizing the ROCC SPOTS event log, at 04:45 hrs., Train ID 422 stopped 103 feet within platform limits at Eastern Market Station, Track 1 after traversing through the interlocking from Track 2 to Track 1 and was keyed down. At 04:49 hrs., Train ID 422 was keyed up on the opposite end of the consist and began to move in the direction of Largo Station, operating up to 7 mph. Train ID 422 then traveled 171 feet and came to a complete stop 9 feet beyond signal D06-02.

According to interviews, the Train Operator claimed to have seen a lunar aspect on signal D06-02. Automatic Train Control Maintenance (ATCM) personnel were dispatched and inspected the associated switches 1A and 3B, routed in the normal position. There was no damage to the switches or their components. No injuries were reported as a result of this incident, and RTRA removed the Train Operator from service for post-incident toxicology testing per RTRA Standard Operating Procedure (SOP) 102-1 Removing an Employee from Service.

The Office of System Maintenance Communication Section (COMM) performed a post-incident, comprehensive radio operational test at Eastern Market Station, Track 1 and Track 2. The test was successful, and the signal was at an optimal level.

The probable cause of the Red Signal Overrun event on December 15, 2020, was the 3000 series insufficient protection against unauthorized movement with zero speed commands. As an additional contributing factor was the Train Operator's lack of situational awareness. The Train Operator did not follow established rules and procedures when they failed to verify the presence of speed commands, a lunar signal, proper rail alignment.

Based on the investigation, the Train Operator was not in compliance with the following MSRPH rules (the rules listed are Cardinal Rules):

GR 1.1 – Failure of any employee to abide by established rules and procedures or failure to use sound judgment, regardless of the time, place, or circumstance, so as to compromise the safety of the public or fellow employees will result in the immediate removal from service, pending an investigation.

OR 3.1 – Customer safety is the responsibility of every WMATA employee; however, Train Operators have the ultimate and final responsibility for the safety of the customers on their particular trains. If any Train Operator is instructed by any person, regardless of rank, title, or position, to take any action which would adversely affect the safety of the customers, the operator shall stop the train, notify ROCC or the Interlocking Operator, and shall not continue until satisfied that it is safe to do so. (Related rules 3.3, 3.4, 3.6, 3.16, 3.67, 3.75).

OR 3.18 – Employees shall not operate any vehicle in a reckless or unsafe manner.

OR 3.67 – Rail vehicles shall not be operated past or closer than a point of ten (10) feet in approach of any interlocking signal or lamp displaying a red aspect. A red flag, or a dark interlocking signal, unless authorized by ROCC or the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1

INCIDENT SITE

Eastern Market Station, D06-02 Signal Red, Track 1

FIELD SKETCH/SCHEMATICS

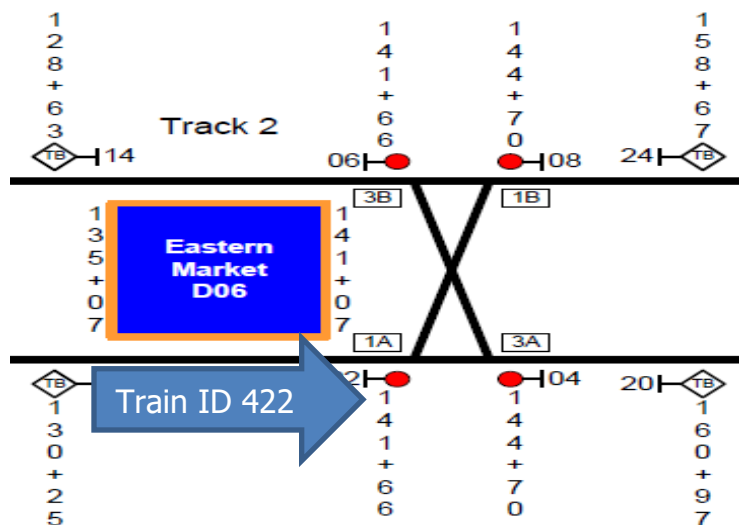


Figure 1: Track Diagram of Eastern Market Station, with impacted signal and switch identified.

PURPOSE AND SCOPE

The purpose of this incident investigation and candid self-evaluation is to collect and analyze available facts, determine the probable cause(s) of the incident, identify contributing factors, and make recommendations to prevent a recurrence.

INVESTIGATIVE METHODS

The investigative methodologies included the following:

- Formal Interviews – SAFE interviewed one individual as part of this investigation. The interview included persons present at, during, and after the time of the incident and those directly involved in the response process. The following individual was interviewed:
 - Train Operator
- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information.
- Documentation Review – A collection of relevant work history information and process documentation in Metro systems of record. These records include:
 - Employee Training Procedures & Records.
 - Certification.
 - The 30-Day work history review.
 - Metrorail Safety Rules and Procedures Handbook (MSRPH).
 - National Oceanic Atmospheric Administration (NOAA).
 - Rail Operations Control Center (ROCC) Procedures Manual Review.
 - Office of System Maintenance Communication Section (COMM) data review.
 - Vehicles Program Services (CENV) post-incident analysis data review.
 - Office of Car Maintenance (CMNT) data review.
 - Maximo.
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback [Radio and Phone Communications].
 - Closed-Circuit Television (CCTV) playback.
 - Advanced Information Management System (AIMS) playback.
 - Rail Operations Control Center (ROCC) SPOTS event log data review.

INVESTIGATION

On Tuesday, December 15, 2020, at approximately 04:49 hrs., the Train Operator of Train ID 422, an employee train 6-car 3000 Series consist, comprised of L3087-3086.3060-3061.3067-3066T overran D06-02 signal red.

CENV data analysis revealed at 04:45 hrs., Train ID 422 stopped 103 feet within platform limits at Eastern Market Station, Track 1, after traversing through the interlocking from Track 2 to Track 1 and keyed down. At 04:49 hrs., Train ID 422 keyed up on the opposite end of the consist and began to move in the direction of Largo Station, operating up to 7 mph. Train ID 422 traveled 171 feet and came to a stop 9 feet beyond the D06-02 signal.

During SAFE's interview with the Train Operator, the Train Operator claimed to see a lunar signal on the D06-02 signal. ATCM personnel were dispatched and inspected the associated switches 1A and 3B, routed in the normal position. There was no damage to the switch or its components. No injuries were reported due to this incident, and RTRA removed the Train Operator from service for post-incident toxicology testing per RTRA's Standard Operating Procedure (SOP 102-1 Removing an Employee from Service).

CLOSED-CIRCUIT TELEVISION (CCTV)

Eastern Market Station Platform CCTV recording revealed the following:



Photo 1: At approximately 04:49:28 hrs., the consist begins to move at Eastern Market Station, Track 1.



Photo 2: At approximately 04:49:39 hrs., the consist passed Eastern Market Station, Track 1, 8-car marker, and it appeared that the D06-02 signal was displaying a "red" aspect as they proceeded to pass the signal.

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

CHRONOLOGICAL TIMELINE OF EVENTS

A review of ARS [Radio and Phone] revealed the following:

Time	Description
04:28:00 hrs.	(Ops 2) Train ID 422 Train Operator contacted the Radio RTC and reported that they are the employee train departing Largo Station and have a good track inspection. The Radio RTC responded, confirm you have a lunar at G05-08 signal, and there is correct rail alignment.
04:40:01 hrs.	(Ops 2) The Radio RTC contacted Train ID 422 and advised D06-08 signal is red, over. Train ID 422 Train Operator acknowledged.
04:46:11 hrs.	(Ops 2) Train ID 422 Train Operator contacted the Radio RTC and reported being at Eastern Market Station and had a good track inspection. The Radio RTC acknowledged.
04:49:36 hrs.	(Ops 2) Train ID 422 Train Operator contacted the Radio RTC and said they have a lunar and on the move. The Radio RTC asked Train ID 422 to repeat their message, and Train ID 422 Train Operator responded disregard.
04:50:07 hrs.	(Ops 2) The Radio RTC contacted Train ID 422 and asked, what's your location? Train ID 422 Train Operator responded I am holding D06-02 signal. The Radio RTC responded, are you properly berthed at Eastern Market Station, Track 1? Train ID 422 Train Operator responded, yes, I am at platform end gate.
04:52:00 hrs.	(Ambient) A ROCC employee instructed the RTC to look at their alarm because they had a train pass D06-02 signal displaying a red aspect.
04:53:02 hrs.	(Ops 2) The Radio RTC contacted Train ID 422 and asked, is your train in Eastern Market Station, Track 1 interlocking? Train ID 422 Train Operator responded, confirm. Radio RTC responded to Train ID 422. Are you confirming you proceeded to pass the D06-02 signal displaying a red aspect? Train ID 422 Train Operator responded affirm.
04:53:37 hrs.	(Ambient) A ROCC employee instructed a WMATA employee to leave Largo Station and report to Eastern Market Station.
04:54:41 hrs.	(Ambient) A ROCC employee contacted a WMATA employee and reported; we need ATCM support at Eastern Market Station due to a Red Signal Overrun.
04:56:17 hrs.	(Ops 2) The Radio RTC contacted Train ID 422 and stated, confirm that you are not moving your train and you are still holding at Eastern Market Station, Track 1 interlocking and that you are still in your lead car on the New Carrollton end, over. Train ID 422 Train Operator responded, confirm. The Radio RTC responded Train ID 422, hold your location, and standby for further instructions.
04:58:12 hrs.	(Ops 2) The Radio RTC contacted an RTRA Supervisor and instructed them to go to Eastern Market Station, Track 1, due to a Red Signal Overrun. The RTRA Supervisor acknowledged.
05:01:36 hrs.	(Phone) Rail Operations Information Center (ROIC) Assistant Superintendent notified Bus Operation Control Center (BOCC) and reported that train service is suspended between Federal Center SW Station and Stadium-Armory Station and requested bus service shuttles.
05:02:33 hrs.	(Ambient) The ROCC contacted a WMATA employee and reported Train ID 422 overran the D06-02 signal displaying a red aspect at Eastern Market Station, Track 1. The ROCC instructed the WMATA employee not to dispatch any more Silver Lines and go to a two (2) minute headway.

05:03:00 hrs.	(Phone) ROCC Assistant Superintendent notified SAFE and reported Train ID 422 overran D06-02 signal displaying a red aspect at Eastern Market Station, Track 1 at approximately 04:49 hrs. The ROCC Assistant Superintendent indicated that until Train ID 422 gets out of the interlocking, train service will be suspended between Federal Center SW Station and Stadium-Armory Station due to a red signal overrun at Eastern Market Station, Track 1, and that shuttle bus service had been requested.
05:03:51 hrs.	(Ops 2) ATCM contacted the Radio RTC and reported that they are standing by at Eastern Market Station, D06-02 signal for support.
05:03:28 hrs.	(Phone) MOC Assistant Superintendent contacted a WMATA employee and advised ATCM is already at Eastern Market Station.
05:04:33 hrs.	(Phone) WMATA Emergency Management contacted the ROCC Assistant Superintendent and advised they are en route to Eastern Market Station and asked if a bus bridge had been initiated. ROCC Assistant Superintendent responded, yes, the bus bridge is being set up at Federal Center SW Station, Minnesota Avenue Station, and Benning Road Station.
05:05:24 hrs.	(Ops 2) The Radio RTC contacted ATCM and asked, what is your location, and do you have a crew with you? ATCM responded, I am at Eastern Market Station, Track 1, 8-car marker platform, and a crew is en route. The Radio RTC acknowledged and gave ATCM Foul Time protection to investigate if Train ID 422 is on the switch point at Eastern Market Station, Track 1. ATCM acknowledged. The Radio RTC responded, "at this time, B06-02 Signal is red, prohibit exits, block calls, cancellation of automatic signals, blue block, and human form status are in place for your protection." You now have Foul Time protection for Track 1 only. The Radio RTC advised ATCM to provide ROCC an update once you get to the switch point. ATCM acknowledged.
05:08:16 hrs.	(Phone) ROCC Assistant Superintendent notified a WMATA employee and reported Train ID 422 overran D06-02 signal displaying a red aspect at Eastern Market Station, Track 1
05:08:53 hrs.	(Ops 2) The Radio RTC contacted ATCM and requested an update. ATCM responded Train ID 422 is berthed just before the switch. The Radio RTC acknowledged and instructed ATCM to clamp Eastern Market Station, Track 1, and Track 2 interlocking in the normal position. ATCM acknowledged.
05:09:00 hrs.	(Phone) ROIC Assistant Superintendent notified BOCC and reported trains being turned around at Federal Center SW Station and Minnesota Avenue Station.
05:13:08 hrs.	(Ops 2) The Radio RTC contacted ATCM and requested an update. ATCM responded 1A switch is clamped in the normal position, and they are currently at the 3A switch and are in the process of clamping the 3A switch as well. The Radio RTC acknowledged and asked ATCM personnel which way would you like the train to proceed? ATCM responded towards Potomac Avenue Station.
05:13:59 hrs.	(Phone) ROCC Assistant Superintendent contacted SAFE and reported ATCM is on the scene and provided them the Train Operator and consist information.
05:13:40 hrs.	(Phone) An ROIC employee contacted a WMATA employee and reported train service is suspended between Federal Center SW Station and Stadium-Armory Station. A WMATA employee responded, make announcements.
05:14:24 hrs.	(Phone) An ROIC employee contacted MTPD and reported train service is suspended between Federal Center SW Station and Stadium-Armory Station. Trains are turning around at D&G Junction D98 due to Eastern Market Station Red Signal Overrun.

05:14:29 hrs.	(Phone) ROIC Assistant Superintendent contacted the Federal Center SW Station Manager and reported a signal issue at Eastern Market Station, which caused train service to be suspended between Federal Center SW Station and Stadium-Armory Station. ROIC Assistant Superintendent instructed the Station Manager to use the line buses if they are available because it will take some time before shuttle busses get established.
05:14:57 hrs.	(Phone) An ROIC employee contacted BOCC and reported train service is suspended between Federal Center SW Station and Stadium-Armory Station. BOCC personnel reported we have five (5) buses headed towards the stations.
05:15:15 hrs.	(Ops 2) ATCM contacted the Radio RTC and reported at D06-02 signal, switches 1A and 3A clamped and tucked in the normal position and reported no damage to the switch. ATCM reported the area was deemed safe for rail vehicle movement.
05:16:39 hrs.	(Phone) A WMATA employee contacted MOC Assistant Superintendent and reported the train is berthed just before the switch.
05:16:40 hrs.	(Ops 2) ATCM contacted the Radio RTC and reported ATCM is standing by on Track 2, and we are clear for rail vehicle movement on Track 1. The Radio RTC responded we need you to walk Train ID 422 through 1A switch and 3A switch no more than five (5) mph after clamping 1B switch and 3B switch.
05:17:19 hrs.	(Ops 2) The Radio RTC contacted ATCM and instructed them to switch back to Track 1 and walk Train ID 422 through now and check lunars after.
05:18:22 hrs.	(Ops 2) The RTRA Supervisor contacted the Radio RTC and advised they are with Train ID 422 Train Operator. The Radio RTC instructed the RTRA Supervisor to take over operations and proceed with Train ID 422 through the interlocking, and you will be flagged through no more than five (5) mph. The RTRA Supervisor acknowledged.
05:20:05 hrs.	(Ops 2) ATCM reported to the Radio RTC that ATCM is standing by and standing clear for rail movement and ready to flag Train ID 422 on Track 1. The Radio RTC acknowledged.
05:21:52 hrs.	(Ops 2) The Radio RTC contacted ATCM and instructed as soon as the train clears the interlocking; I need you to walk over to Track 2 to clamp 1B and 3B switch in the normal position.
05:22:11 hrs.	(Phone) ATCM contacted MOC Assistant Superintendent and asked if SAFE responded to the scene to conduct a physical site assessment because WMATA employees are trying to move the consist. MOC Assistant Superintendent responded I don't know why but TRST is en route, and ATCM is on scene.
05:22:28 hrs.	(Phone) WMATA Executive Management contacted the ROCC Assistant Superintendent and asked was the red signal overrun a revenue or employee train. The ROCC Assistant Superintendent responded the consist was a Largo Division employee train and that ATCM walked the train through the interlocking and clamped switches in the normal position and reported no damage to the switch. ATCM reported the area was deemed safe for rail vehicle movement.
05:24:11 hrs.	(Phone) A WMATA Employee of Media Relations contacted ROIC Assistant Superintendent and asked was the Red Signal Overrun at Eastern Market Station a non-revenue train. The ROIC Assistant Superintendent responded, yes, it was before revenue started, and it was Train ID 422. Train ID 422 was en route to the interlocking to go in service. The ROIC Assistant

	Superintendent reported the train has cleared the interlocking now and is en route to New Carrollton Rail Yard.
05:25:20 hrs.	(Ops 2) ATCM reported to the Radio RTC that Track 2 switch 1B and switch 3B are clamped in the normal position. ATCM reported that the Eastern Market Station interlocking area was deemed safe for rail vehicle movement.
05:25:34 hrs.	(Phone) ROCC Assistant Superintendent contacted SAFE and reported that ATCM reported the switches were already clamped in the correct position on Track 1. Hence, ATCM walked the train through the interlocking, and there was no damage to report.
05:26:10 hrs.	(Ops 2) ATCM reported to the Radio RTC that all ATCM personnel and equipment are standing by and standing clear on the platform and are relinquishing their Foul Time.
05:27:01 hrs.	ROIC Assistant Superintendent contacted BOCC and reported we are going back to normal service.
05:28:00 hrs.	(Phone) ROCC Assistant Superintendent contacted a WMATA employee and reported that we are back to normal service at Eastern Market Station, Track 1, and Track 2.
05:29:05 hrs.	(Ops 2) The Radio RTC contacted RTRA Supervisor and advised, once you get relieved, contact the ROCC because we need you to escort the Train Operator for post-incident toxicology testing. The RTRA Supervisor acknowledged and reported that the lead car is 3087.
05:29:23 hrs.	(Phone) Potomac Avenue Station Manager contacted an ROIC employee and requested an update on the shuttle bus. The ROIC employee responded that we are in the process of setting up normal service on Track 1 and Track 2 and will probably be normal before the shuttle bus gets there.
05:29:35 hrs.	(Ops 2) The Radio RTC announced train service had been restored. All trains that have been instructed to hold can now service and continue on Ops 2.

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

ADVANCED INFORMATION MANAGEMENT SYSTEM (AIMS)

AIMS playback showed non-revenue Train ID 422 berthed at Eastern Market Station, Track 1 platform. Train ID 422 then began to move in the direction of Largo Station while D06-02 signal displayed a red aspect. Train ID 422 then passed signal D06-02 displaying a red aspect. (See AIMS Playback Figures 2-5).

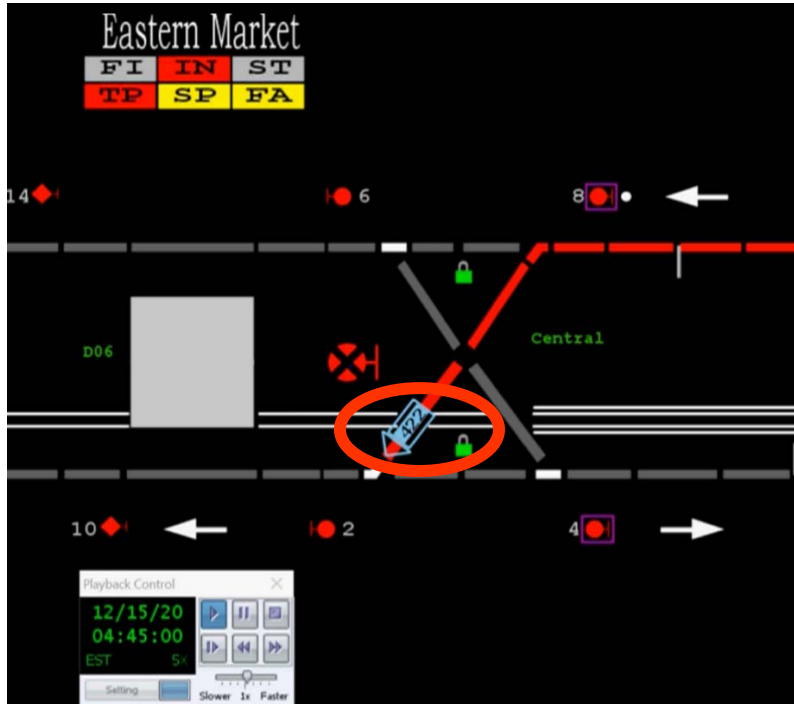


Figure 2: Shows non-revenue Train ID 422 entering Eastern Market Station traversing through the interlocking from Track 2 to Track 1 in the direction of Federal Triangle Station.



Figure 3: Shows non-revenue Train ID 422 berthed at Eastern Market Station, Track 1 platform.

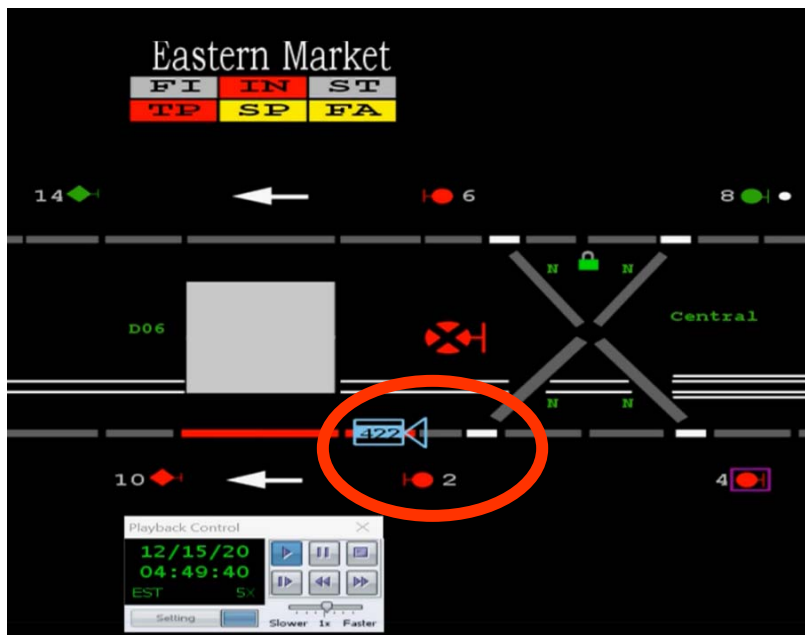


Figure 4: Shows non-revenue Train ID 422 began to move in the direction of Largo Station at Eastern Market Station, Track 1, while D06-02 signal displayed a red aspect.

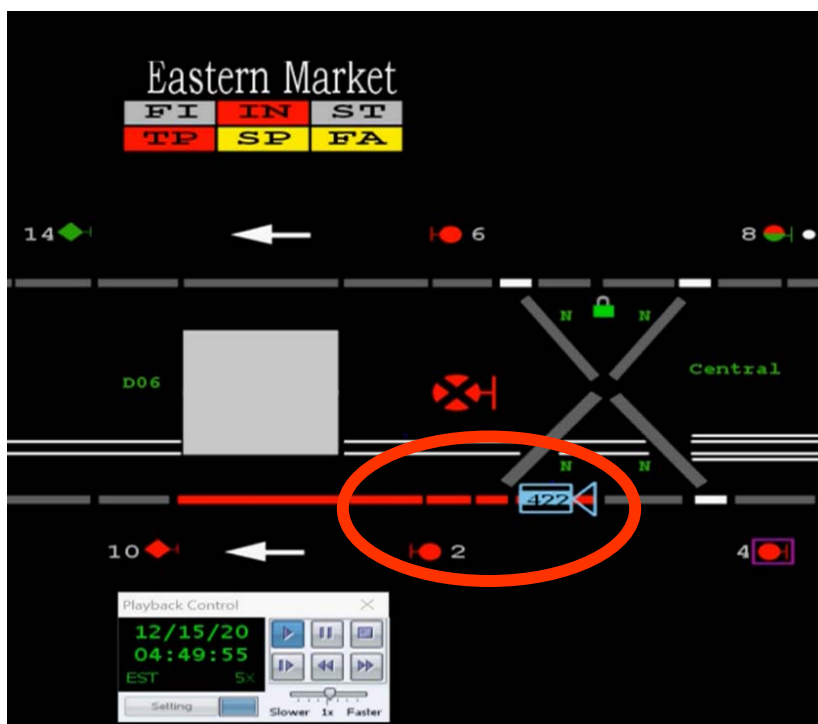


Figure 5: Shows non-revenue Train ID 422 proceeded past signal D06-02 displaying a red aspect.

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

VEHICLES PROGRAM SERVICES (CENV)

Event Recorder (ER) Data Graph/Sequence of Events

Based on the CENV analysis, the ATC wayside equipment did not communicate with the Vehicle Monitoring System (VMS) due to problems with the car ATCS (Automatic Train Control System) on either end of the incident train. CENV did not identify any discrepancies that could've contributed to the red signal overrun event. CENV utilized the ROCC SPOTS event log data in conjunction with the consist, and details from the data analysis are as follows:

TIME	Description
04:39:50 hrs.	The consist enters Potomac Avenue Station, Track 2, towards Eastern Market Station.
04:45:51 hrs.	The consist stopped 103 feet within platform limits at Eastern Market Station after changing over from Track 2 to Track 1 and then keyed down.
04:49:23 hrs.	The consist opposite end, car 3087, was keyed up.
04:49:32 hrs.	The consist train began to move in the direction of Largo Station, operating up to 7 mph.
04:49:50 hrs.	The consist traveled 171 feet and came to a stop 9 feet beyond the D06-02 signal.

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

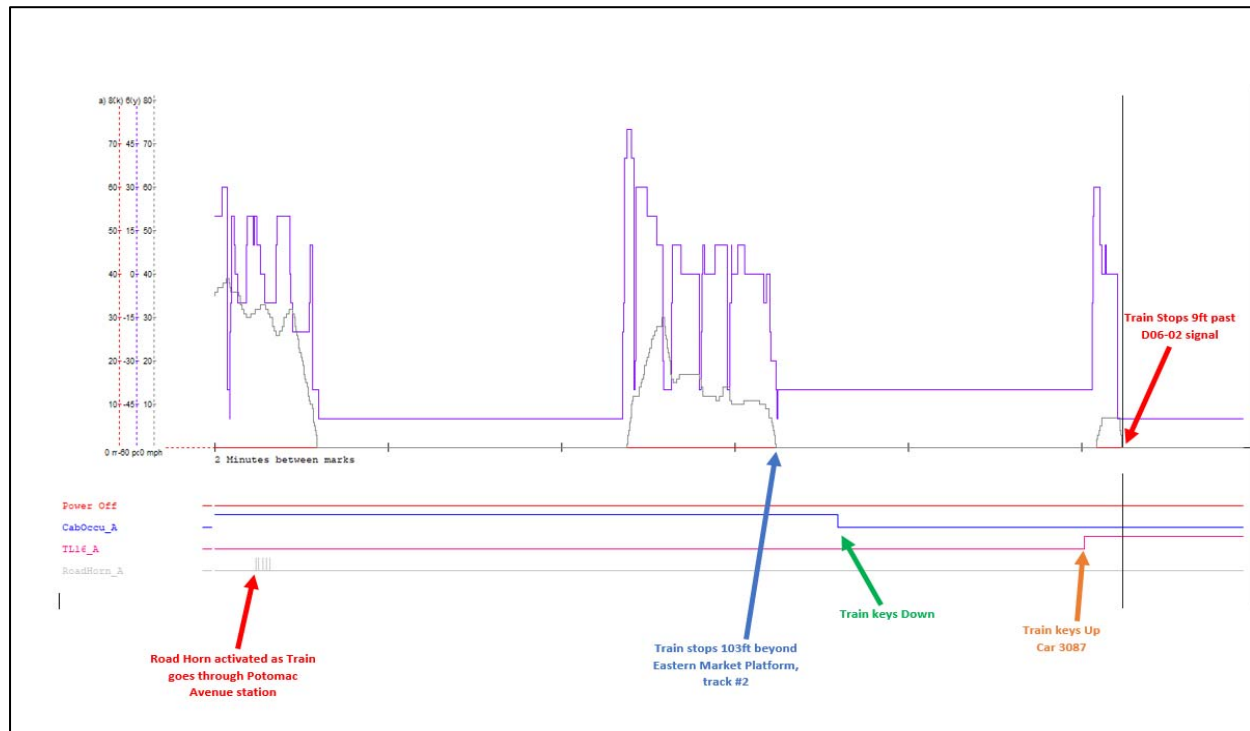


Figure 6: ER Graphical Analysis

Note: The consist data showed no faults observed or any abnormalities with the car's operations contributing to this incident.

Based on CENV analysis, the following discrepancies were found with the VMS system and require additional maintenance actions:

Car 3066 VMS was not communicating with ATCS (Automatic Train Control System).
Cars 3066-67 had only one (1) feedback signal package communicating with the VMS.
Cars 3066-67 propulsion was not communicating with the VMS.
Car 3086 VMS was not communicating with ATCS.
Cars 3086-87 had only one (1) feedback signal package communicating with the VMS.
Cars 3086-87 propulsion was not communicating with the VMS.

Note: The ATCS discrepancies did not affect the Automatic Train Protection (ATP) of the consist, only the data collection function.

AUTOMATIC TRAIN CONTROL MAINTENANCE (ATCM)

All switch components were inspected, and no damage was found. Additionally, details of the ATCM data analysis of the Automatic Train Control System wayside components are as follows:

TIME	Description
04:44:54 hrs.	Train consist crossed over from Track 2 to Track 1 and enters Eastern Market Station platform on Track 1, traveling inbound. Train ID 422 sits on the platform.
04:49:46 hrs.	The consist passed the insulated rail joint into interlocking. Train 422 overruns the signal while displaying a red aspect.
05:20:52 hrs.	The consist continued traveling in the outbound direction on Track 1.
05:22:39 hrs.	The consist traveled out of the interlocking in the outbound direction on Track 1.

OFFICE OF SYSTEM MAINTENANCE COMMUNICATION SECTION (COMM)

COMM performed a comprehensive radio operational test at Eastern Market Station, Track 1 and Track 2. The test was successful, and the signal was at an optimal level.

Note: After reviewing the Audio Recording System playback, there did not appear to be any communication deficiencies over the radio.

OFFICE OF CAR MAINTENANCE (CMNT)

CMNT personnel performed an exterior and interior inspection of the affected car and found no equipment-related issues. Additionally, a post-incident inspection on the brake system, propulsion system, and master controller operations was performed and all were found to be working as designed. CMNT did not identify any discrepancies that could've contributed to the red signal overrun event.

INTERVIEW FINDINGS

SAFE conducted one interview via virtual Microsoft Teams. This interview identified the following key findings associated with this event and are as follows:

The Train Operator was operating Train ID 422, which was the first employee train out of the Largo Division. The Train Operator was assigned to transport an employee from Largo Station to Eastern Market Station and then return to Largo Station. The Train Operator indicated that when they arrived at Eastern Market Station, they traversed the consist through the interlocking from Track 2 to Track 1 and keyed down after berthing at Eastern Market Station, Track 1. The Train Operator then went to the opposite end of the consist, car 3087, and keyed up. When the Train Operator reversed ends, the D06-02 signal was lunar, and they communicated with the ROCC that they had a lunar and were on the move. At that point, the ROCC responded, "Repeat your message." The Train Operator responded, "disregard because the signal changed to red," and they went into brake mode. The ROCC asked the Train Operator if their train was properly berthed at Eastern Market Station Platform. The Train Operator responded that their train was beyond the end gate. The Train Operator was subsequently removed from service and taken for post-incident toxicology testing.

FINDINGS

- ATCM inspected elements of the track's infrastructure with no defects to report.
- The 3000 Series cars are not equipped with forward-facing and operator console camera capabilities.
- Based on CENV data, the incident consist performed as designed, and CENV did not observe any brake or propulsion anomalies.
- The Train Operator's training class had a long gap between the classroom and practical training due to COVID-19 limitations.
- Unlike the 7000 series cars, 2000 and 3000 series cars do not require a code to move in the absence of speed commands in "Stop and Proceed Mode." The Train Operator can operate without speed commands up to 15 mph.
- The Train Operator claimed to see a lunar signal on the D06-02 signal before proceeding. However, AIMS playback showed Train ID 422 proceeded to pass signal D06-02 displaying a red aspect. This action is not in compliance with OR 3.67 – Rail vehicles shall not be operated past or closer than a point of ten (10) feet in the approach of any interlocking signal or lamp displaying a red aspect. A red flag, or a dark interlocking signal, unless authorized by ROCC or the Interlocking Operator and the move is consistent with customer safety specified in Rule 3.1.
- Train ID 422 was the employee train out of Largo Town Center Station.
- Train Operator completed refresher training on December 23, 2020.
- Train Operator has only been certified as a Train Operator since November 2020.

WEATHER

At the time of the incident, NOAA recorded the temperature at 39°F with passing clouds and 50% humidity. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: National Oceanic and Atmospheric Administration – Location: Washington, DC.)

HUMAN FACTORS

FATIGUE

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

Note: The Train Operator was in the 1st hour of an 8-hour shift.

POST-INCIDENT TOXICOLOGICAL TESTING

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

IMMEDIATE MITIGATION TO PREVENT RECURRENCE

- RTRA removed the Train Operator from service for post-incident toxicology testing.
- ATCM conducted track and switch inspections.
- RTRA removed Train ID 422 from service for post-incident inspection.

PROBABLE CAUSE STATEMENT

The probable cause of the Red Signal Overrun event on December 15, 2020, was the 3000 series insufficient protection against unauthorized movement with zero speed commands. As an additional contributing factor was the Train Operator's lack of situational awareness. The Train Operator did not follow established rules and procedures when they failed to verify the presence of speed commands, a lunar signal, proper rail alignment

Based on the investigation, the Train Operator was not in compliance with the following MSRP rules (the rules listed are Cardinal Rules):

GR 1.1 – Failure of any employee to abide by established rules and procedures or failure to use sound judgment, regardless of the time, place, or circumstance, so as to compromise the safety of the public or fellow employees will result in the immediate removal from service, pending an investigation.

OR 3.1 – Customer safety is the responsibility of every WMATA employee; however, Train Operators have the ultimate and final responsibility for the safety of the customers on their particular trains. If any Train Operator is instructed by any person, regardless of rank, title, or position, to take any action which would adversely affect the safety of the customers, the operator shall stop the train, notify ROCC or the Interlocking Operator, and shall not continue until satisfied that it is safe to do so. (Related rules 3.3, 3.4, 3.6, 3.16, 3.67, 3.75).

OR 3.18 – Employees shall not operate any vehicle in a reckless or unsafe manner.

OR 3.67 – Rail vehicles shall not be operated past or closer than a point of ten (10) feet in approach of any interlocking signal or lamp displaying a red aspect. A red flag, or a dark interlocking signal, unless authorized by ROCC or the Interlocking Operator and the move is consistent with customer safety as specified in Rule 3.1.

RECOMMENDATIONS/CORRECTIVE ACTIONS


The following are the recommendations and corrective actions identified as a result of this investigation and analysis of similar events. These recommendations and corrective actions are tracked via SAFE / Rail Ops working group and will be verified by SAFE upon completion. These have been shared with the WMSC and are part of an overall WMATA campaign to reduce station overruns and red signal violations.

Action	Update	Date
Incident Review Board Charter	Root Cause / Corrective Action (RCCA) Committee commenced in early 2020.	July 2020 (Completed)
Station Overrun Analysis Report	Definition overrun established in WI 801-02 (<i>Station Overrun Management Response Procedures</i>)	December 2020 (Completed)
Establish rule for speed approaching platform	Establish a rule formalizing the not-to-exceed speed requirement when approaching platforms in manual mode. Permanent Order T-21-02.	March 2021 (Completed)
Station Overrun Campaign	Outreach efforts including messaging, ride checks, management review, notice submissions, Hot Spot Safety Poster distribution	October/November 2020 (Completed)

APPENDIX A - CMNT RED SIGNAL OVERRUN INSPECTION SPECIAL INSTRUCTION

Always Check Source Document for Current Revision,

CMNT SPECIAL INSTRUCTION		
Subject: Inspection Requirements for Class 1 Rail Vehicles that Overran a Red Signal		
Document No.	<input type="text" value="SIP G004"/>	
Revision No.	Reason / Description	Revision Issue Date
0.0	Original Document	March 14, 2019




Washington Metropolitan Area Transit Authority

Job Plan Number:

Job Plan Title:

Job Plan Revision Level: Job Plan Revision Date:

Approval Signature: 

**General Superintendent (GS)
Office of Car Maintenance (CMNT)**

SIP G004, Rev. 0.0Date 03/14/2019

Uploaded to Documentum on 03/14/2019

CMNT SPECIAL INSTRUCTION

Subject: Inspection Requirements for Class 1 Rail Vehicles that Overran a Red Signal

This Special Instruction Procedure (SIP) is being issued to all CMNT Personnel that work on class 1 rail vehicles to ensure they follow the protocols established herein for this process.



Personal Protective Equipment (PPE): Standard Shop PPE shall be worn at all times while working on and around class 1 rail vehicles.

When a class 1 rail vehicle and/or consist has been reported to CMNT for a “Red Signal Overrun” CMNT technicians shall perform the following actions and document all findings in Maximo.

- Brake Rate Check for Lead Vehicle.
- Master Controller Operational Check
- Visually Inspect Wheels for Flats on Lead Vehicle; if flats and/or spalling is noted/found the entire consist shall have all wheels inspected.
- Visually Inspect the Wheel Flange for the Lead Vehicle or Vehicles that Crossed the Switch (**ONLY** when CMNT is notified that the vehicle went through a switch that was not properly aligned)
- Perform a Daily Inspection



Washington Metropolitan Area Transit Authority

METRORAIL SAFETY RULES AND PROCEDURES HANDBOOK

PERMANENT ORDER

NO. T-21-02 MSRP Section 3, Operating Rules	Approved Date: Tuesday, March 02, 2021
Affected Rule/SOP: Section 3, 3.82	Effective Date: Tuesday, March 02, 2021

TO: All

Scope:

Permanent Order T-21-02 modifies MSRP Section 3 - Operating Rules governing train operating speeds.

Purpose:

Permanent Order T-21-02 Purpose: To establish maximum train speed when entering a rail station while in revenue service.

Permanent Order Rule Modification:

Additions to rules and procedures are shown in **Bold** and Underline text; deletions are struck-through (e.g., ~~Rule Deletion~~).

3.82 Employees shall not operate rail vehicles at speeds higher than the maximum authorized speed.

3.82.1 Maximum speed for trains passing through a station without stopping is 25 Mph (deadhead speed).

3.82.2 When operating in manual mode while in revenue service, Train Operators shall begin to reduce train speed upon passing the “S” marker.

3.82.3 Train Operators, operating in manual mode while in revenue service, shall enter the station at speed no greater than 40 MPH and be prepared to properly berth the train at the “8” car marker.

APPENDIX C – INTERVIEW SUMMARIES

RTRA

Train Operator

The Train Operator is a WMATA employee with one month of experience as a Train Operator with 12 years of service. The Train Operator started as a Bus Operator then certified as a Train Operator in November 2020.

During the virtual interview, the Train Operator stated they were operating Train ID 422, the first employee train out of the Largo Division. The Train Operator was assigned to transport an employee from Largo Station to Eastern Market Station and then return to Largo Station. When the Train Operator arrived at Eastern Market Station, they traversed the consist through the interlocking from Track 2 to Track 1 and keyed down after berthing at Eastern Market Station Track 1. The Train Operator then went to the opposite end of the consist car 3087 and keyed it up. Upon keying up, the Train Operator proceeded to operate the consist in Largo Station's direction; they always had a Lunar. The Train Operator mentioned that when they reversed ends [changed train operating ends], the D06-02 signal was Lunar. They communicated with the ROCC that they had a Lunar and, on the move, and the ROCC responded, repeat your message. The Train Operator responded disregard because the signal changed to red and went into braking mode. The ROCC asked the Train Operator to report their location and the Train Operator responded, holding at D02-06 signal. The Train Operator indicated that the ROCC wondered whether the train was berthed correctly at Eastern Market Station platform. The Train Operator responded that the train was beyond the end gate. The Train Operator indicated that ROCC asked if their consist was in the interlocking and the Train Operator said no. The Train Operator was subsequently removed from service and taken for post-incident toxicology testing.