



WMSC Commissioner Brief: W-0186 – Improper Vehicle Movement – McPherson Square Station – June 23, 2022

Prepared for Washington Metrorail Safety Commission meeting on November 15, 2022

Safety event summary:

A Train Operator of a Blue Line train that had been taken out of service due to a mechanical issue improperly operated the train beyond a permissive block given by the Rail Operations Control Center (ROCC) Rail Traffic Controller. A permissive block is a section of clear track ahead of a train in the established direction of traffic up to a specific point into which no other train is permitted. A permissive block is required when trucks are cut out. Cutting trucks on a car involves disabling the friction braking system on that specific car.

Prior to the event, customers were offloaded from the train at Federal Triangle Station at the request of a Car Maintenance (CMNT) Mechanic who boarded the consist to assist after the Train Operator reported having a flashing motor overload indicator. After passengers were offloaded, the train was placed out of service and the trucks were cut out on one of the cars due to heavy brake odor. The ROCC Controller gave the Train Operator a permissive block to the 8-car marker at Metro Center Station and instructed them to perform a Rolling and Rolling Brake Test to ensure the car was rolling freely. After successfully completing the test, the Train Operator continued in non-passenger service beyond the permissive block and did not contact the ROCC to request another permissive block until after operating the train approximately 305 feet past McPherson Square Station. Metrorail policies require Train Operators to request and receive a new permissive block each time they reach the end of the previous one granted when trucks are cut out. Following this event, the Train Operator was granted a permissive block to Farragut West Station where they were removed from service for post-event toxicology testing, however the ROCC Controller was not, even though it is required by WMATA policy in this circumstance.

When interviewed, both the Train Operator and the ROCC RTC reported poor radio communication during the event. Despite these reports, the Office of Radio Communications (COMR) concluded there were no deficiencies.

Probable Cause:

The probable cause of this event was a lack of supervisory oversight to ensure that safety rules are consistently followed regarding permissive blocks and 100% repeat back of instructions. Contributing to this event were radio communications systems deficiencies.

Corrective Actions:

ROCC Management posted and distributed Safety Bulletin SB-22-06A Requirements for Post-Accident and Post Incident Testing.

ROCC Management conducted safety talks with all Rail Traffic Controllers to emphasize the importance of receiving word for word repeat backs from all personnel and vehicle movement requests via the radio.

WMATA established procedures to conduct observations of word for word repeat backs of radio transmissions in order to recommend feedback to ROCC Management.

WMSC staff observations:



Metrorail should address the underlying maintenance issue that led to the event, which the report demonstrates could have been avoided. CMNT found the same issues occurred on June 21 and June 23, yet the car continued to be put into service. This entire event could have been prevented through proactive data monitoring and action to identify and replace the local propulsion supervisor unit and install the new software before putting the car into service. In addition, the issue of parts being used on railcars that don't perform as intended, resulting in immediate or quick failure (bad stock replacement items) after installation should be addressed.

In WMATA's ongoing implementation of its safety management system, the Office of Rail Transportation has identified radio communication unpredictability in known dead zones in the yard and the mainline as its top hazard.

COMR's inability to identify, reproduce and address the radio deficiencies both the Train Operator and ROCC Controller reported experiencing is a common occurrence the WMSC highlighted in our September 2022 audit of WMATA's communications systems ([See Finding 4](#)). The audit found that Metrorail personnel are not effectively communicating, responding to and identifying issues related to trouble calls pertaining to communications systems. Metrorail closes communications related "corrective maintenance" (repair) ticket without effectively identifying, documenting and addressing issues. Minimum corrective actions include requiring Metrorail to require personnel to document detailed information regarding identification and troubleshooting procedures attempted when responding to corrective maintenance orders.



Washington Metropolitan Area Transit Authority
Department of Safety (SAFE)
Office of Safety Investigations
FINAL REPORT OF INVESTIGATION A&I E22386

Date of Event:	06/23/2022
Type of Event:	Improper Rail Vehicle Movement
Incident Time:	06:50 hours
Location:	McPherson Square Station, Track 2
Time and How received by SAFE:	06:52 hours via MAC Notification
WMSC Notification Time:	07:21 hours
Responding Safety Officers:	WMATA: No WMSC: No Other: No
Rail Vehicle:	Train ID 401 L3202.3203-3289.3288-3136.3137T
Injuries:	No
Damage:	No
Emergency Responders:	RTRA, CMNT
SMS I/A Number	20220629#101262

McPherson Square Station – Improper Rail Vehicle Movement

June 23, 2022

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Abbreviations and Acronyms

AIMS	Advanced Information Management System
ARS	Audio Recording System
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
CMNT	Office of Car Maintenance
CMOR	The Office of the Chief Mechanical Officer
COMR	Office of Systems Maintenance, Office of Radio Communications
I/A	Incidents/Accidents
IIT	Incident Investigation Team
MAC	Mission Assurance Coordinator
MOL	Motor Overload
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic and Atmospheric Administration
OSI	Office of Safety Investigations
ROCC	Rail Operations Control Center
ROCS	Rail Operations Control System
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
SAFE	Department of Safety
SMS	Safety Measurement System
SRC	Safety Risk Coordinator
VMS	Vehicle Monitoring System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

On Thursday, June 23, 2022, at approximately 06:50 hours, an Alexandria Division Train Operator, operating outbound Blue Line Train ID 401 [L3202.3203-3289.3288-3136.3137T] towards Franconia-Springfield Station, improperly moved their train with trucks cut out beyond the permissive block issued by the Rail Operations Control Center (ROCC) Rail Traffic Controller (RTC). Prior to the improper movement, the Train Operator experienced a flashing motor overload (MOL) indication and requested assistance from the Office of Car Maintenance (CMNT) Mechanic. The CMNT Mechanic contacted the ROCC RTC to request Train ID 401 be offloaded and the front and rear trucks cut out on Car #3289 due to a heavy brake odor. With permission, the Train Operator of Train ID 401 proceeded to Federal Triangle Station to offload the customers. The ROCC RTC instructed the Train Operator of Train ID 401 to re-block the train to Train ID 701. The RTC then granted the Train Operator of Train ID 701 a permissive block up to the Metro Center Station 8-Car Marker on Track 2 and instructed them to perform a Rolling and Rolling Brake Test to verify that the consist was rolling freely. The Train Operator reported they successfully performed the Rolling and Rolling Brake Test and proceeded towards Metro Center Station.

The Train Operator then continued operating past Metro Center and McPherson Square Stations without stopping. The Train Operator contacted the RTC and requested a permissive block in approach to Farragut West Station. The RTC advised the Train Operator of Train 701 of the requirement for permissive blocks for trains operating with trucks cut out. The RTC contacted an Office of Rail Transportation (RTRA) Supervisor to meet the Train Operator at Farragut West Station. The Train Operator was removed from service for the violation. There were no injuries or damages reported as a result of this incident.

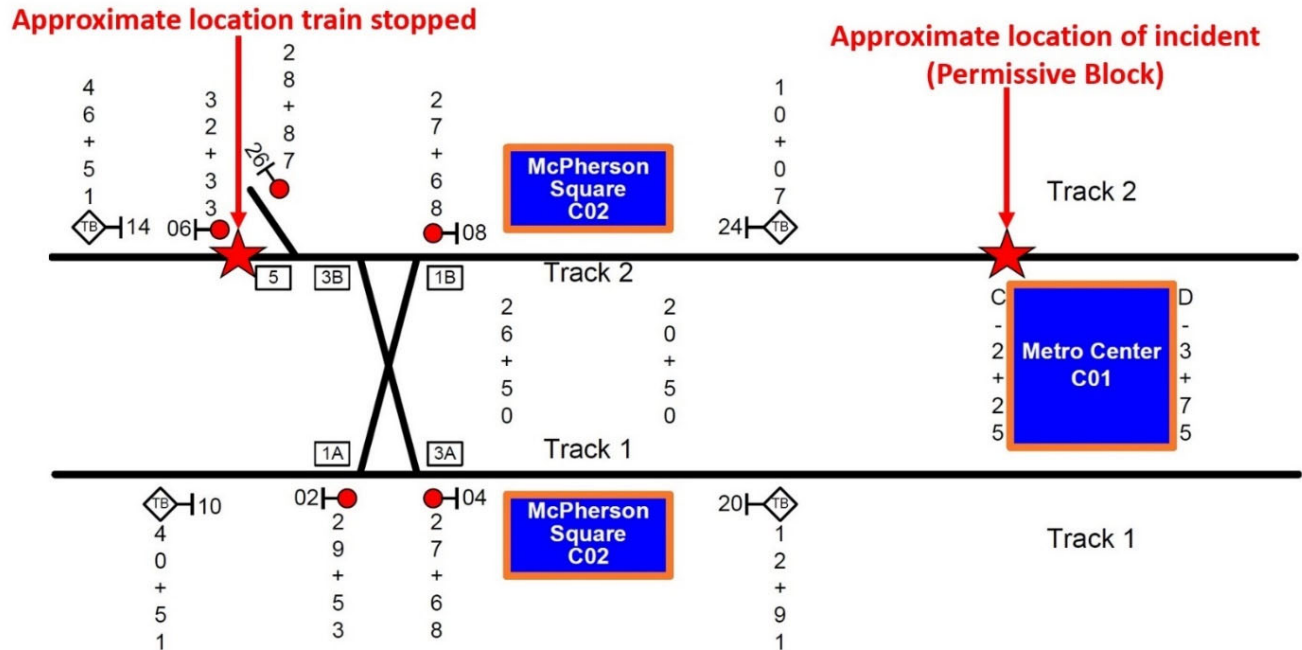
Based on Closed-Circuit Television (CCTV) playback, the Train Operator of Train ID 701 entered the platform limits of McPherson Square Station at approximately 06:52 hours. The Train Operator then proceeded through and cleared the station at approximately 06:53 hours. The Incident Investigation Team (IIT) analysis determined the train came to a complete stop approximately 308 feet beyond the end gate at McPherson Square Station. The Train Operator was given a permissive block to Farragut West Station by the RTC and relieved by the RTRA Supervisor upon arrival.

The probable cause of the improper rail vehicle movement incident was a human factors failure to perform in accordance with established procedure, which resulted in the Train Operator exceeding their permissive block. Contributing factors included ineffective communications as the RTC issued permissive block instructions to the Train Operator and those instructions were not repeated word for word (100%) back to the RTC.

Incident Site

McPherson Square Station, Track 2

Field Sketch/Schematics



Purpose and Scope

This incident investigation and candid self-evaluation aim 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 three individuals as part of this investigation. Representatives from the Washington Metrorail Safety Commission (WMSC) were invited to participate. SAFE interviewed the following individuals:
 - Train Operator
 - Rail Traffic Controller
 - CMNT Mechanic
- Documentation Review – Collection of relevant work history information and process documentation contained in WMATA systems. These records include:
 - Train Operator Training Records
 - Train Operator Certifications
 - Train Operator 30-Day work history review
 - Metrorail Safety Rules and Procedures Handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA)
 - Rail Operations Control Center (ROCC) Incident Report
 - Rail Operations Control System (ROCS) SPOTS Report
 - Maximo Data

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

Investigation

A review of the systems of record indicated that at approximately 06:50 hours, an Alexandria Division Train Operator, operating outbound Blue Line Train ID 401 [L3202.3203-3289.3288-3136.3137T] towards Franconia-Springfield Station, improperly moved the train consist with trucks cut out and without a permissive block from the Rail Operations Control Center (ROCC) Rail Traffic Controller (RTC). The Train Operator experienced a flashing MOL indication and requested the assistance from the Office of Car Maintenance (CMNT) Mechanic. The CMNT Mechanic boarded Train ID 401 at L'Enfant Plaza Station and verified the mechanical issues with the train. The CMNT Mechanic verified the heavy brake odor in addition to the motor overload indication and recommended to cut the front and rear trucks out on Car #3289. The CMNT Mechanic communicated their recommendations to ROCC and the Train Operator was instructed to offload their customers at Federal Triangle Station. The RTC instructed the Train Operator of Train ID 401 to re-block the train to Train ID 701.

While reviewing audio playback via ARS, the radio transmissions between the RTC and Train Operator appeared slightly distorted. After the CMNT Mechanic verified and reported to the RTC the train was clear of customers, the RTC instructed the Train Operator to perform a "Rolling, Rolling Brake Test" towards Smithsonian Station and then to proceed with a permissive block up to Metro Center Station. The RTC contacted the Train Operator a second time advising them of the restricted speeds while traveling through stations at no more than 25 mph. The Train Operator acknowledged the RTC's instructions regarding the restricted speed limit only and did not repeat the permissive block instruction. At approximately 06:53 hours, the Train Operator contacted the RTC and reported they are passing McPherson Square Station and requested the next permissive block. The RTC advised the Train Operator to stop their train at their location as they were to stop at each permissive block until the next permissive block is provided. The RTC then contacted an RTRA Supervisor that was located at Farragut West Station. The RTC provided the Train Operator a permissive block up to the 8-Car Marker at Farragut West Station. The Train Operator was relieved by the RTRA Supervisor upon arrival at Farragut West Station. There were no injuries or damages reported as a result of this incident. A review of the vehicle systems did not reveal any anomalies that would have resulted in an improper rail vehicle movement incident.

Chronological Event Timeline

A review of ARS playback, i.e., phone and radio communications revealed the following timeline:

Time	Description
06:34:03 hours	<u>Train Operator of Train ID 401:</u> Train Operator contacted ROCC and reported they have a flashing MOL in approach to Potomac Avenue Station, Track 2. The RTC requested the lead car number and the Train Operator provided Car 3202. The RTC contacted the nearest Road Mechanic at L'Enfant Plaza Station and instructed them standby for Train 401, Track 2 for a reported flash MOL. The Road Mechanic acknowledged. [OPS 2]

Time	Description
06:42:50 hours	<u>CMNT Mechanic:</u> CMNT Mechanic contacted ROCC and reported a flashing MOL and brake odor from Car #3289. CMNT Mechanic recommended they offload the train. RTC instructed to conduct the offload at Federal Triangle Station. RTC instructed the Train Operator to make good announcements to customers about the offload at Federal Triangle Station. [OPS 2]
06:46:04 hours	<u>RTC:</u> RTC instructed the Train Operator to verify the first two cars of the consist were clear of customers and for the CMNT Mechanic to verify the rest of the consist were clear customers at Federal Triangle Station. CMNT Mechanic acknowledges. [OPS 2]
06:46:59 hours	<u>Train Operator of Train ID 401:</u> Train Operator contacted RTC and reported they are offloaded at Federal Triangle. Asked RTC if they should walk through cars to verify if the train is clear of customers or to continue on. The RTC instructed the Train Operator to standby as the CMNT Mechanic is walking through the consist to verify it is clear of customers. Train Operator acknowledges they are standing by while CMNT conducts their inspection. [OPS 2]
06:47:37 hours	<u>RTC:</u> RTC instructed the Train Operator of Train ID 401 to re-block their train to Train ID 701 and they will be in non-revenue service while proceeding to the Alexandria Yard. [OPS 2]
06:47:47 hours	<u>CMNT Mechanic:</u> CMNT Mechanic contacted RTC and requested permission to cut the front and rear trucks on Car #3289. RTC grants permission to cut trucks. [OPS 2]
06:48:34 hours	<u>CMNT Mechanic:</u> CMNT Mechanic contacted RTC and reported trucks are cut out and green indicator lights are verified on Car #3289. The RTC instructed the CMNT Mechanic to remain aboard and provided the Train Operator of Train 701 with a permissive block to turn back and perform a Rolling and Rolling Brake Test to verify if the train is rolling freely. Train Operator acknowledges they have a permissive block to turn back to conduct the Rolling and Rolling Brake Test. [OPS 2]
06:50:10 hours	<u>Train Operator of Train ID 701:</u> Train Operator of Train ID 701 reported they conducted the Rolling and Rolling Brake Test successfully and the consist is rolling freely. The RTC provided the Train Operator with a second permissive block to Metro Center Station, Track 2, speed not to exceed 45 mph and not to exceed 25 mph going through stations. The Train Operator acknowledges the speed restrictions going through stations only. [OPS 2]
06:53:00 hours	<u>Train Operator of Train ID 701:</u> Train Operator contacted RTC and reported they were passing McPherson Square and requested the next permissive block. The RTC advised the Train Operator of Train ID 701 that once they have a permissive block they must stop at that location until they are provided another block as there is revenue moving ahead of them. The RTC asked the Train Operator how they copy and instructed them to stop their train. The RTC dispatched an RTRA Supervisor to Farragut West Station and provided the Train Operator a permissive block to Farragut West Station. Train Operator acknowledged the permissive block and performed a word for word repeat back. The RTC instructed the Train Operator to hold at the 8-car marker for the Supervisor. [OPS 2]

Time	Description
06:56:04 hours	<u>Train Operator of Train ID 701:</u> Train Operator contacted RTC and reported they properly berthed at 8-car marker at McPherson Square Station and the RTRA Supervisor is on board the train. The RTC instructed the RTRA Supervisor key up and to take control of the train, key down and key back up and standby for their permissive block. [OPS 2]
06:57:04 hours	<u>RTC:</u> RTC contacted the Train Operator of Train ID 701 and asked if the RTRA Supervisor had taken control of the train. They responded "yes" the RTRA Supervisor is now in control of the train. The RTC provided the RTRA Supervisor with a permissive block to Foggy Bottom Station, Track 2. [OPS 2]

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

The Office of Chief Mechanical Officer (CMOR) / Vehicle Monitoring System (VMS) Timeline

IIT CMOR analysis of the VMS data from Train ID 701 verified the Train Operator of Train ID 701 did not stop at Metro Center Station after departing Federal Triangle Station. Train ID 701 was offloaded at Federal Triangle Station and was then given a permissive block to Metro Center Station. Train ID 701 responded to the commands entered in the Master Controller at the time. Train ID 701 overran the permissive block and stopped approximately 308 feet beyond the 8-Car Marker at McPherson Square Station. Train ID 701 stopped for a few moments and then continued to Farragut West Station.

"Based on the VMS data, the IIT concluded there were no mechanical failures that contributed to the Train Operator bypassing the permissive block."

Adopted from CMOR IIT Report:

Time	Description
06:46:43 hours	Train ID 701 offloaded passengers at Federal Triangle Station.
06:50:14 hours	Master Controller was placed on power mode and Train ID 701 proceeded to McPherson Square Station.
06:53:38 hours	Train ID 701 passed the 8-Car Marker at 18 mph and the Master Controller placed on Coast.
06:53:53 hours	Train ID 701 stopped approximately 300 feet beyond the 8-Car Marker at McPherson Square Station.
06:54:38 hours	Master Controller was placed in Power Mode and Train ID 701 proceeded to Farragut West Station.

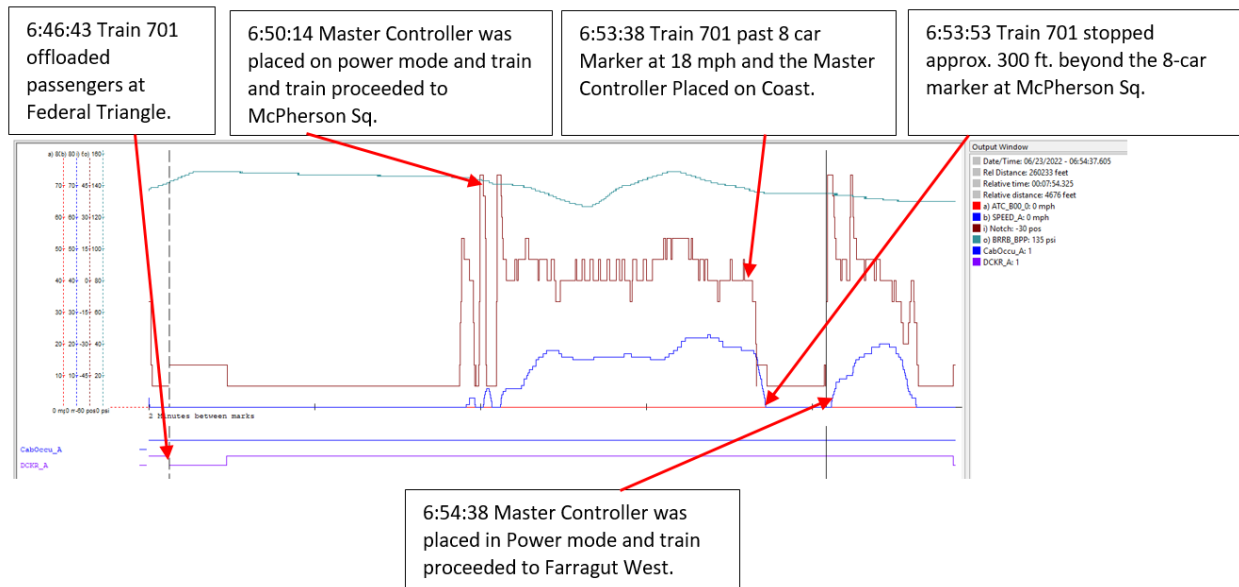


Diagram 1 – IIT CMOR VMS analysis showing Train Operator's movements from Federal Triangle to McPherson Square Station.

Advanced Information Management System (AIMS) Playback

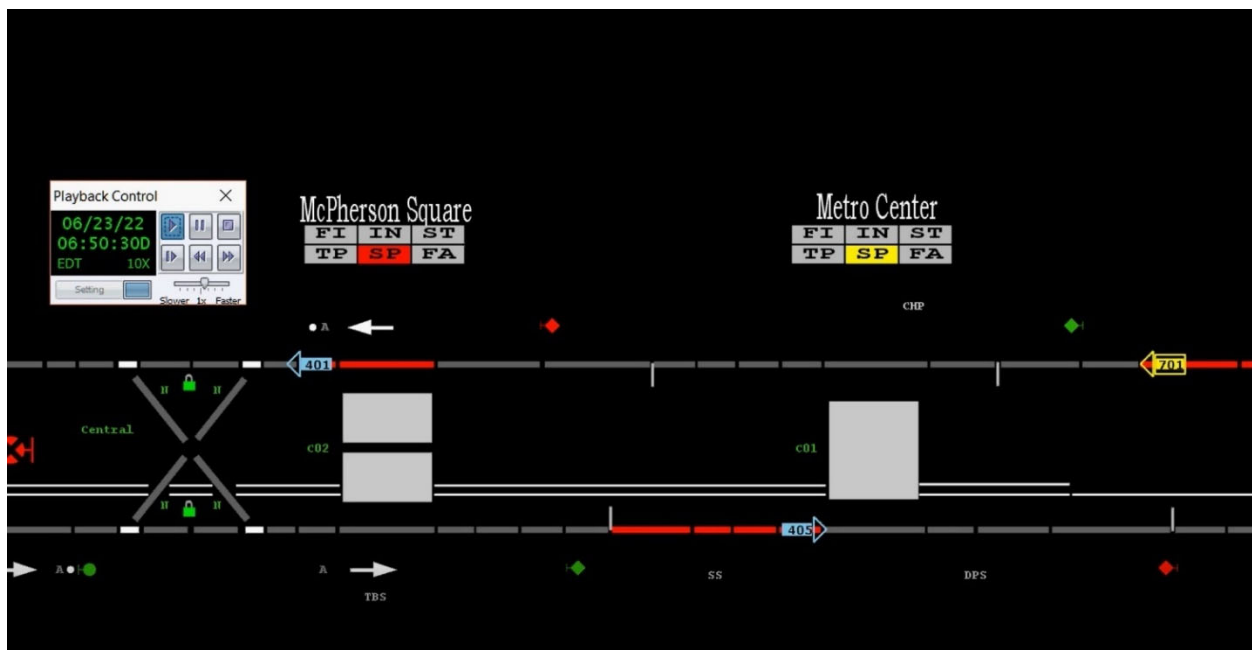


Figure 1 – Train ID 701 approaching Metro Center Station, Track 2 at approximately 06:50:30 hours.

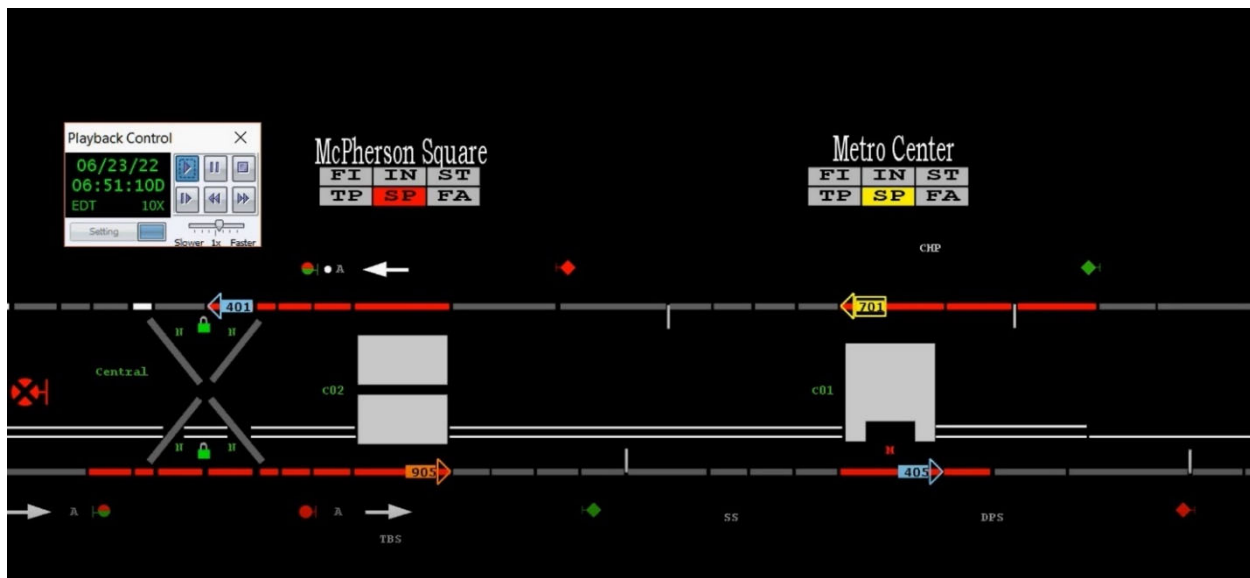


Figure 2 – Train ID 701 approaching the end of the permissive block at Metro Center Station, Track 2, 8-Car Marker at approximately 06:51:10 hours.

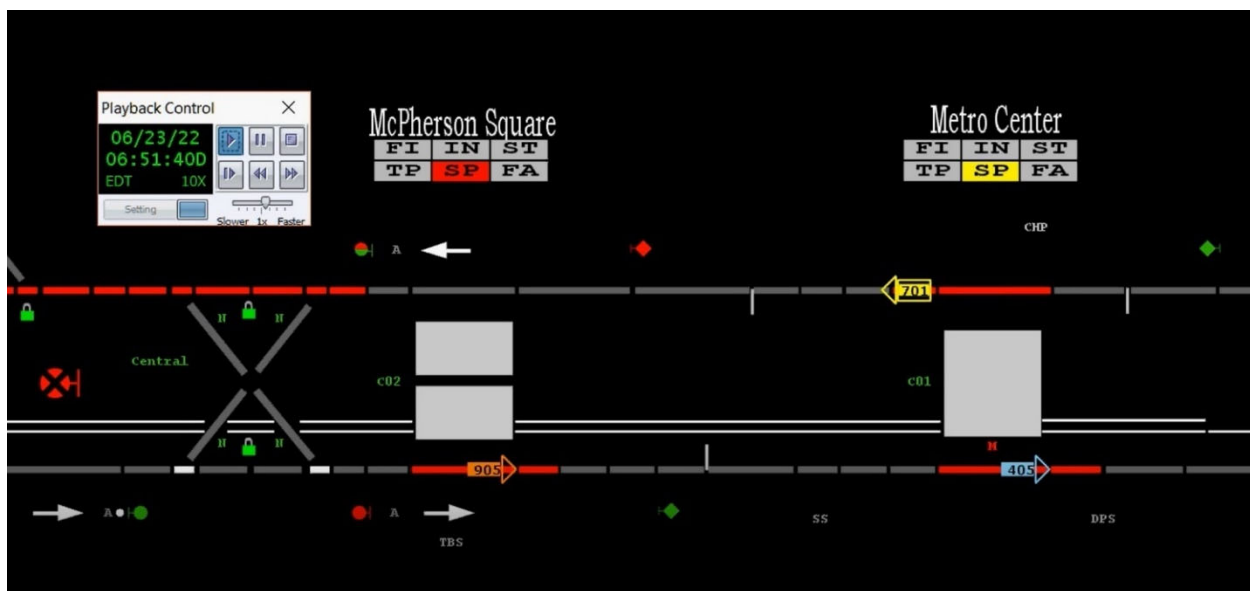


Figure 3 – Train ID 701 bypassed the permissive block at Metro Center Station and proceed towards McPherson Square Station at approximately 06:51:40 hours.

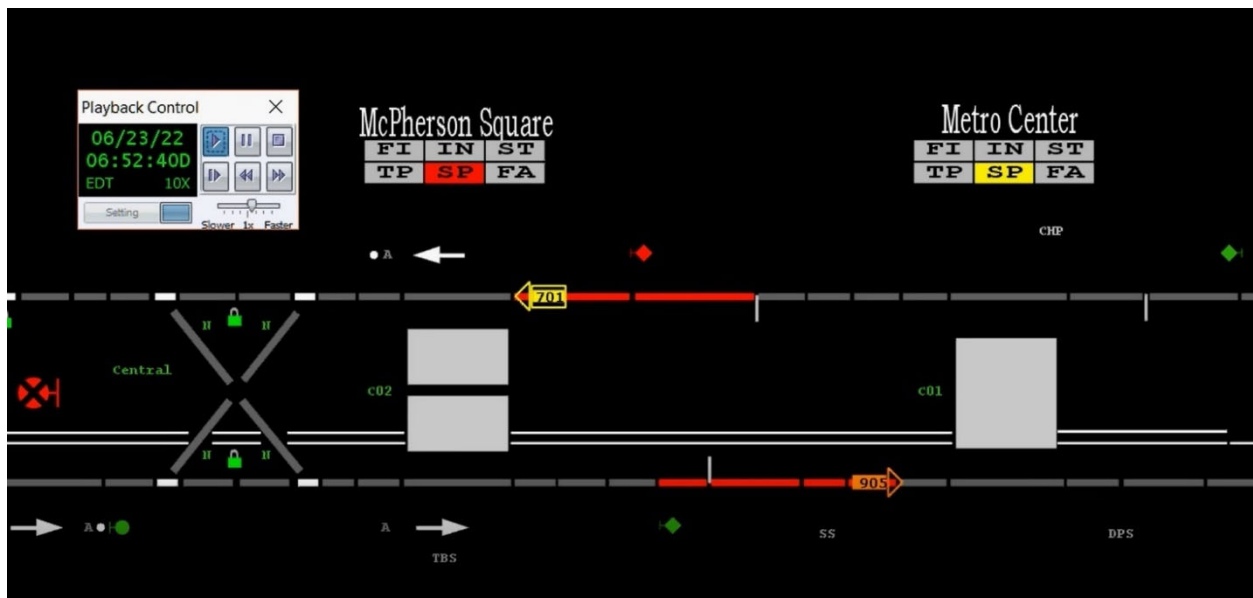


Figure 4 – Train ID 701 approaching McPherson Square Station, Track 2 at approximately 06:52:40 hours.

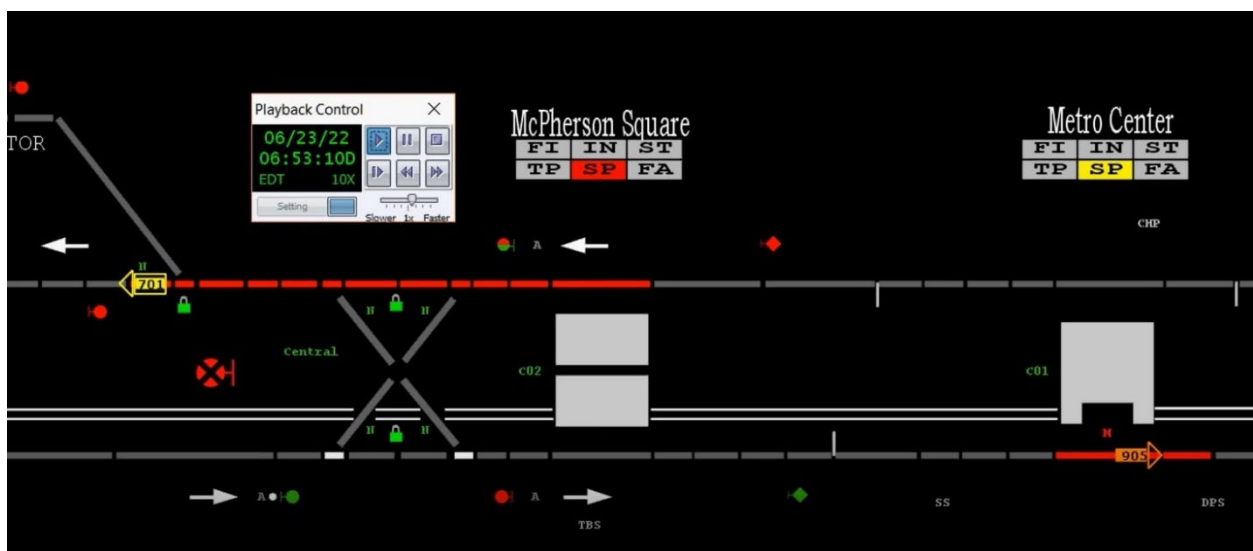


Figure 5 – Train ID 701 proceeded past the 8-Car Marker at McPherson Square Station, Track 2 at approximately 06:53:10 hours.

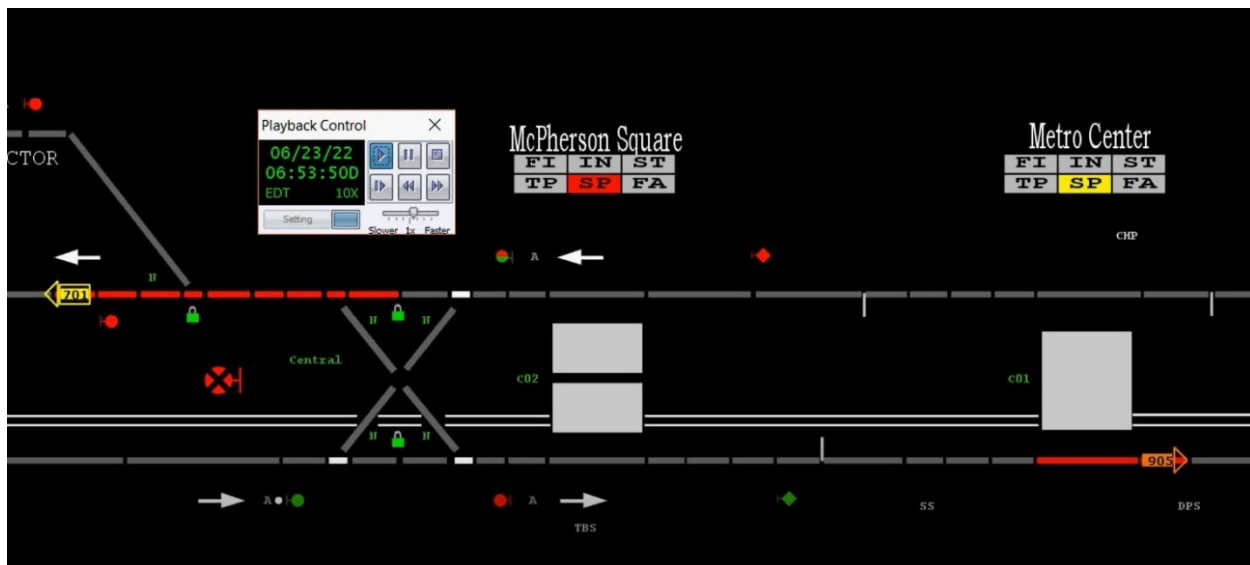


Figure 6 – Train ID 701 came to a complete stop approximately 308 feet beyond the 8-Car Marker at McPherson Square Station, Track 2 at approximately 06:53:50 hours.

Closed-Circuit Television (CCTV) Playback

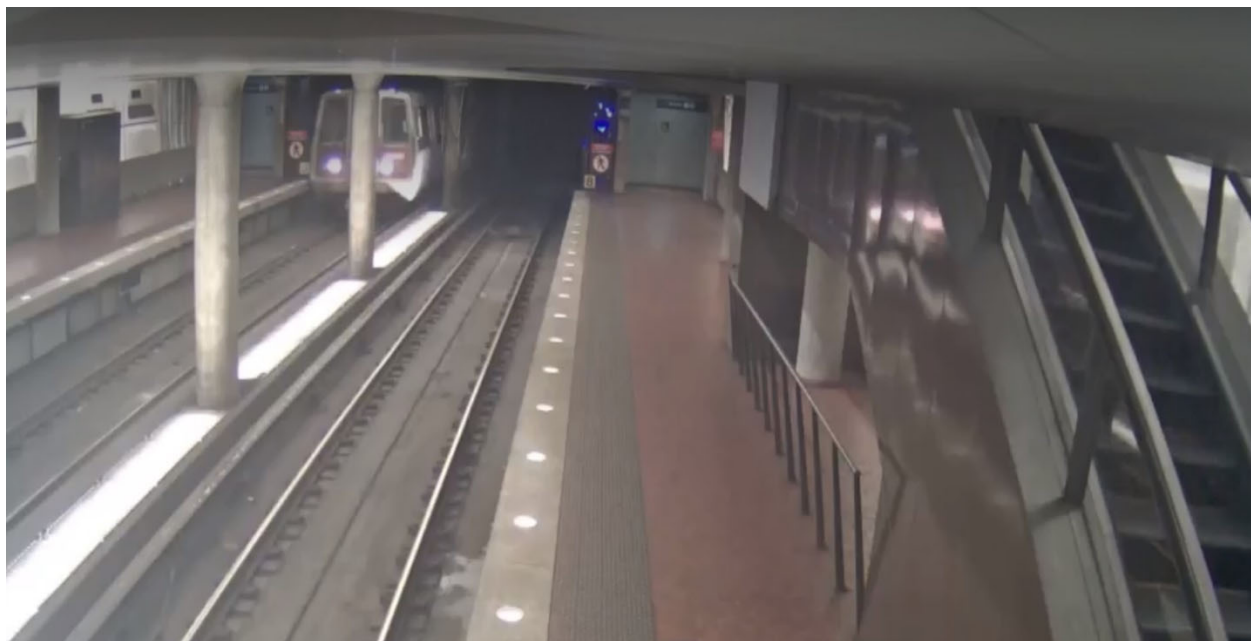


Figure 7 – Train ID 701 enters McPherson Square Station platform limits, Track 2 at approximately 06:52:35 hours.



Figure 8 – Train ID 701 approaches the 8-Car Marker at McPherson Square Station, Track 2 at approximately 06:52:53 hours.

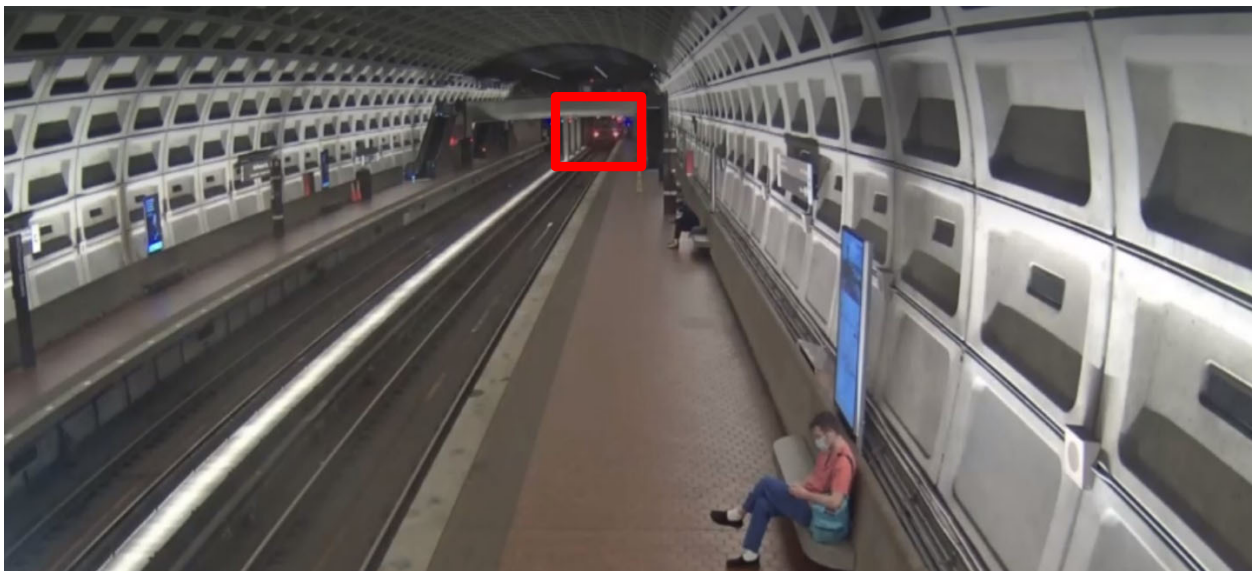


Figure 9 – Train ID 701 passes the 8-Car Marker at McPherson Square Station, Track 2 at approximately 06:53:11 hours.

Office of Car Maintenance (CMNT)

The CMNT Mechanic boarded Train ID 401 at L’Enfant Plaza Station and verified the MOL indication and also reported a heavy brake odor. With the front and rear trucks cut out on Car #3289, the CMNT Mechanic stayed onboard the incident car while the Train Operator performed the Rolling and Rolling Brake Test. The CMNT Alexandria Yard Service and Inspection Shop performed the necessary repairs and recommended the car as ready for service. (see Appendix C).

Office of System Maintenance, Office of Radio Communications (COMR)

SAFE Office of Safety Investigations (OSI) requested COMR personnel to perform radio checks of the affected area and COMR personnel concluded no defects or issues were found with radio communications near Federal Triangle Station. (See Appendix D).

Interview Findings

Based on the investigation launched into the Improper Rail Vehicle Movement at McPherson Square Station, SAFE conducted three formal interviews with the Rail Traffic Controller, Train Operator and CMNT Mechanic via Microsoft Teams. The interviews conducted identified the following key findings associated with this event. Findings detailed below include reported information from interviews and may conflict with other data sources contained in the report:

Train Operator

The Train Operator stated that their train experienced a Motor Overload and they reported the observation to ROCC. The Train Operator stated that Road Mechanic suggested to ROCC that the train should be taken out of service. The Train Operator stated they were instructed to offload the train at Federal Triangle. The Train Operator stated that they were familiar with SOP 15. The Train Operator stated that they were given a permissive block to Metro Center from ROCC. Train Operator stated that there was poor radio communication during the transmissions and background noise from the Control Center.

Rail Traffic Controller

The RTC reported the incident train was experiencing a mechanical issue. The RTC stated a CMNT Mechanic was dispatched to assist. The RTC reported the CMNT Mechanic found other issues and recommended to offload the train. The RTC provided the Train Operator a permissive block to Metro Center after a successful Rolling and Rolling Brake Test. The RTC reported the Train Operator requested an additional permissive block beyond Metro Center. The RTC stated radio communications were faulty and may have contributed.

CMNT Mechanic

The CMNT Mechanic stated they responded to a request for assistance. They boarded Train ID 401 at L'Enfant Plaza Station and witnessed the MOL indicator flashing and a strong brake odor. The CMNT Mechanic received permission from ROCC to cut out the trucks on the incident car. The CMNT Mechanic stated this was their normal procedure for these types of incidents. The CMNT Mechanic stated after trucks were cut, the Train Operator performed a Rolling and Rolling Brake Test and they continued train until arrival in the Alexandria Yard. They did not recall the permissive block provided to the Train Operator by the Radio RTC.

Weather

At the time of the incident, NOAA recorded the temperature at 77° F, scattered clouds, 71% humidity, winds 3 mph with visibility of 10 miles. The event occurred within a tunneled section of the rail system. Weather was not a contributing factor in this event (Weather source: NOAA – Location: Washington, DC.)

Human Factors

Fatigue

Train Operator

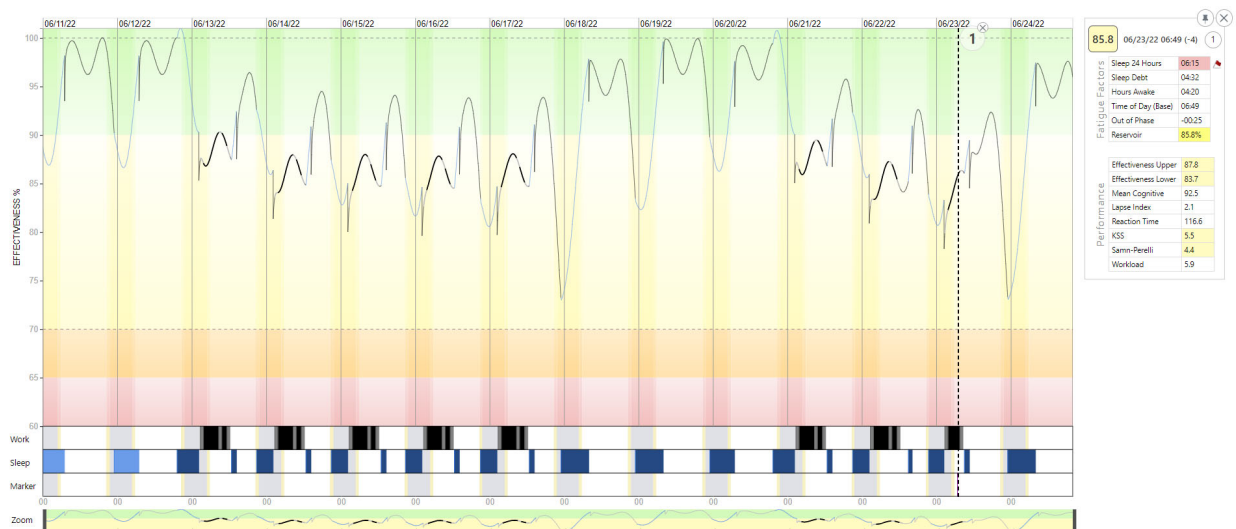
Evidence of Fatigue:

The incident data was evaluated for evidence of fatigue that may have been present at the time of the incident. No video was available to ascertain whether signs of fatigue were present. The Train Operator reported feeling fully alert at the time of the incident and did not report any symptoms of fatigue in the time leading up to the incident.

Fatigue Risk:

Incident data was evaluated for fatigue risk factors. Risk factors for fatigue were identified. The incident time of day (06:50 hours) did not suggest an increased risk of fatigue-related impairment. The employee worked a day shift in the days leading up to the incident. The employee reported a short sleep duration of 5 hours of sleep in the 24 hours preceding the incident. This was less than the employee's usual sleep duration. The employee was awake for 4.3 hours at the time of the incident. The off-duty period preceding the incident was 16.4 hours long, which provided the opportunity for 7-9 hours of sleep. The employee reported usual workday sleep durations of 7 hours and has trouble staying asleep.

A biomathematical fatigue modelling application (SAFTE-FAST WebSFC) was used to further evaluate fatigue risk factors that may have been present in the Train Operator's schedule. The analysis was based on the Train Operator's work schedule, reported sleep from the day before the incident, and reported habitual sleep durations. Estimated performance effectiveness at the time of the incident was 85.8%. The analysis yielded no major risk factors for fatigue.



Modeling analysis output shows estimated performance effectiveness during the incident work shift and for the week leading up to the work shift, based on the employee work and reported sleep schedule. Estimates were based on the Train Operator's work schedule, reported sleep from the day preceding the incident, and reported habitual sleep durations (7 hours a day). Bold portions of the modeled curve show work (in black)

and sleep times (in blue). Effectiveness is shown on the vertical axis, with colored fields in the chart background signifying ranges of effectiveness scores including high effectiveness (>90%) in green, and low effectiveness (<65%) in red. Time is shown on the horizontal axis. Markers for work and sleep times are shown in the lanes above the time of day on the horizontal axis.

Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined the Train Operator was not in violation of the Drug and Alcohol Policy and Testing Program 7.7.3/7.

Immediate Mitigation to Prevent Recurrence

- Train ID 401 was offloaded and re-blocked as Train ID 701.
- CMNT Mechanic recommended to cut trucks on Car #3289.
- RTRA Management removed the Train Operator from service for post-incident toxicology testing.
- RTRA Management removed the incident consist from service for CMNT inspection and IIT CMOR analysis.

Related Rules and Procedures

- Section 3 – Operating Rules Ver 1.22 – 3.22 – Mode 2 – Level 2
- SOP #15 – Absolute Block / Permissive Block

Findings

- ROCC RTC issued a permissive block to Metro Center Station to the Train Operator, however the Train Operator did not repeat back the instruction.
- Train Operator bypassed the permissive block at Metro Center Station and continued beyond McPherson Square Station, Track 2 before contacting ROCC for another permissive block.
- Train Operator bypassed McPherson Square Station by approximately 308 feet before requesting a permissive block to Farragut West Station.
- IIT VMS analysis revealed no defects with lead Car #3202.
- While several fatigue risk factors were identified for the Train Operator, fatigue modeling did not indicate a significant risk of fatigue impairment at the time of the event.
- COMR testing within the incident area were unable to identify or reproduce any communications deficiencies with the radio system.

Probable Cause Statement

The probable cause of the improper rail vehicle movement incident was a human factors failure to perform in accordance with established procedure, which resulted in the Train Operator exceeding their permissive block. Contributing factors included ineffective communications as the RTC issued permissive block instructions to the Train Operator and those instructions were not repeated word for word (100%) back to the RTC.

SAFE Recommendations

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, and the respective departmental Safety Risk Coordinator (SRC) will manage the mitigation. Refer to the SMS I/A Module for additional information.

Corrective Action Code	Description	Responsible Party	Due Date
101262_SAFE CAPS_RTRA_001	(RC-1) RTRA Management will ensure the Train Operator conducts refresher training focusing on radio communications and train operations when blocks are cut out.	RTRA SRC	Completed
101262_SAFE CAPS_RTRA_002	(RC-1) RTRA Management will ensure the Train Operator receives an in-service evaluation monitoring all phases of operating the train to include proper radio communications and word for word repeat backs.	RTRA SRC	Completed
101262_SAFE CAPS_ROCC_001	ROCC Management will conduct safety talks with all Rail Traffic Controllers to emphasize the importance of receiving word for word repeats backs from all personnel and vehicle movement requests via the radio.	ROCC SRC	Completed
101262_SAFE CAPS_ROCC_002	ROCC Management will post and distribute Safety Bulletin SB-22-06A Requirements for Post-Accident and Post Incident Testing.	ROCC SRC	Completed
101262_SAFE CAPS_SAFE_001	SAFE Management will establish procedures to conduct observations of word for word repeat backs of radio transmissions in order to recommend feedback to ROCC Management.	SAFE SRC	Completed

Appendices

Appendix A – Interview Summaries

The below narratives are summaries of the interviews with SAFE and represent the statements made by the involved individuals. As such, times and details may present a conflict with the data contained in systems of record.

Train Operator

This employee is a WMATA Train Operator with a total of 18 years of service: one year as a Bus Operator, and 17 years as a Train Operator. The Train Operator's last certification was in December of 2020. This employee reported having trouble staying asleep.

Based on the SAFE interview, the Train Operator stated that their train experienced a Motor Overload and they reported the observation to ROCC while in approach to Potomac Avenue Station. The Train Operator stated the Road Mechanic suggested to ROCC that the train should be taken out of service. The Train Operator stated they were instructed to offload the train at Federal Triangle. The Train Operator stated that they were familiar with SOP 15. The Train Operator stated they were given a permissive block to Metro Center from ROCC. Train Operator stated that there was poor radio communication during the transmissions and background noise from the Control Center.

Rail Traffic Controller

This employee is a WMATA Rail Traffic Controller (RTC) with sixteen years of service: five years as a Rail Traffic Controller. The RTC reported their last certification was in June of 2022. This employee has no history of sleep issues to report.

During the interview, the RTC stated the Train Operator of Train ID 401 reported they were experiencing a mechanical issue; a flashing motor overload light (MOL). The RTC stated normally they would dispatch a CMNT Mechanic or RTRA Supervisor to assist in this type of situation. For this occurrence, they reported that they requested and dispatched a CMNT Mechanic to assist. The RTC stated the CMNT Mechanic investigated the MOL but found other dynamic and propulsion issues. The RTC reported receiving a recommendation from the CMNT Mechanic to offload the train which was unusual when compared to their experience. They stated the CMNT Mechanic also requested to cut the trucks out on one car after the train was offloaded. The RTC reported they granted the CMNT Mechanic permission to cut the trucks as the subject matter expert on scene. They reported the CMNT Mechanic was instructed to cut the trucks on 3289 and to notify when trucks were cut out verified green. The RTC stated the Train Operator was given permission to perform a Rolling and Rolling Brake Test with a permissive block to the turnback; and to verify if the consist was moving freely. The RTC stated the Train Operator appeared feeling rushed and they reminded them they needed a permissive block before departing as the CMNT Mechanic was cutting the front and rear trucks out. The RTC stated the Train Operator reported a good Rolling and Rolling Brake Test and was provided a permissive block to Metro Center Station. They then reported the Train Operator was advised of the speed limits while operating and through stations with the trucks cut out. The RTC stated the Train Operator acknowledged the speed limitations but did not repeat back word for the word the permissive block limit. The RTC reported there have been recent issues with radio communications and they currently have active work orders addressing the situation. The RTC stated they think the radio issues did not help with proper communications with the Train Operator.

CMNT Mechanic

This employee is a WMATA CMNT Mechanic AA with 23 years of service: seven years as CMNT Road Mechanic. The CMNT Mechanic reported their last certification was in May of 2021. This employee has no history of sleep issues to report.

During the interview, the CMNT Mechanic stated their responsibilities include receiving and responding to requests from the ROCC to assist train operators with mechanical problems on the train. They reported they boarded Train ID 401 at L'Enfant Plaza to investigate for an MOL. The CMNT Mechanic stated they witnessed a brake odor and they offloaded at Federal Triangle as they received permission from ROCC to cut out the trucks on the incident car. The CMNT Mechanic stated this was their normal procedure for these types of incidents. They stated normal procedure is to board the train and investigate to find the car with the malfunction. The CMNT Mechanic stated after trucks were cut, the Train Operator performed a Rolling and Rolling Brake Test and they remained on the defective car until they arrived at Alexandria Yard. The CMNT Mechanic reported they were not aware an incident had occurred and did not recall the radio transmissions about the permissive blocks.

Appendix B – Rail Operations Control Center (ROCC) Incident Report

View Approved Incident Report

INCIDENT ID: 2022174BLUE1				
DATE 2022-06-23	TIME 0645	LINE Blue	ITEM 1	
LOCATION (STATION/YARD) Federal Triangle (D01)		LOCATION/CHAIN MARKER (If Applicable)		REPORTED BY CMNT [REDACTED]
TRAIN ID 401	DIRECTION I/B	TRACK NUMBER 2	DEPTS NOTIFIED Everbridge Alert/Messaging	
CAR NUMBERS (XXXX-XXXX)				
Lead Car				
3202-3203	3289-3288	3136-3137	-	
Caused Issue <input type="checkbox"/>	Caused Issue <input checked="" type="checkbox"/>	Caused Issue <input type="checkbox"/>	Caused Issue <input type="checkbox"/>	
TRBL CODE MOLF- FLASHING MOTOR OVERLOAD CONDIT		RESP CODE CMD		
TYPE INCIDENT Intermittent White Lights, Strong Brake Odor, and Flashing Motor Overload.				
ACTION PLAN Train Offloaded, Trucks Cut, Train Removed From Revenue Service.				
DELAYS IN MINUTES				
LINE	INCIDENT	TRAIN	TOTAL DURATION	
20	20	4	0	
TRIPS MODIFIED				
PARTIAL	GAP TRAIN	LATE DISPATCHES	REROUTED	NOT DISPATCHED
2	1	0	0	0
FIVE PRIMARY CONSOLE INDICATIONS				
BCP	BRAKES ON ILLUMINATED	ALL DOORS CLOSED ILLUMINATED	AUTO\MANUAL BPP ILLUMINATED	BPP
Yes	Yes	Yes	MANUAL	Yes

Attachment 1 – Page 1 of 3.

Incident Date: 06/23/2022 Time: 06:50 hours
Final Report – Improper Rail Vehicle Movement
E22386

Drafted By: SAFE 702 – 10/10/2022
Reviewed By: SAFE 71 – 10/14/2022
Approved By: SAFE 71 – 10/14/2022

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View Approved Incident Report

INCIDENT CHRONOLOGY	
TIME	DESCRIPTION
0645	CMNT [REDACTED] contacted ROCC at Smithsonian track two, and requested Train ID #401 be offloaded, due to a flashing motor overload and a heavy brake odor on car number 3289. CMNT [REDACTED] also recommended the front and rear trucks on the reported car be cut out. AOM, ROIC, CMNT, and all concerned departments were notified.
0646	Train ID #401 arrived at Federal Triangle track two, CMNT [REDACTED] reported the train was all cleared of all customers, the front and rear trucks were cut on car number 3289, and green brake indicators lights were verified. Alexandria gap train #735, was implemented track two at McPherson Square to supplement Blue line customer service in the direction of Franconia-Springfield.
0648	Train ID #401 Operator [REDACTED] was instructed to re-block the train to ID #701, and was granted a permissive block to the turn back to perform a rolling, rolling brake test to verify the consist was rolling freely. CMNT [REDACTED] instructed to remain aboard, Operator [REDACTED] reported the consist was rolling freely.
0650	Operator [REDACTED] was then provided a second permissive block to Metro Center track two, speeds not to exceed 45mphs in-between and 25mphs through stations.
0653	Operator [REDACTED] contacted ROCC requesting a block in approach to Farragut West, with the replacement Train #401 servicing the platform. Train Operator [REDACTED] had over shot the permissive block provided and was instructed to stop the train.
0656	Operator [REDACTED] was advise of the infraction and provided a permissive block to Farragut West platform track two, where she was removed from service by RTRA Supervisor [REDACTED] and Utility Supervisor [REDACTED]. Train ID# 701 continued under permissive blocks to Alexandria yard for storage, Operated by Utility Supervisor [REDACTED].
0659	Train ID #402 serviced track two Federal Triangle ending the longest customer delay in the direction of Franconia-Springfield.

MAXIMO TICKET#
8609314

REPORT PREPARED BY	NAME	CLICK TO SIGN
RADIO CONTROLLER 1	[REDACTED]	✓
BUTTON CONTROLLER 1	[REDACTED]	✓
RADIO CONTROLLER 2		
BUTTON CONTROLLER 2		

SUPERINTENDENTS OR ASSISTANTS SECTION		
ADDITIONAL FOLLOW-UP CORRECTIVE ACTIONS OR REMARKS		
FOLLOW-UP INFORMATION OBTAINED FROM SUPPORT DEPARTMENTS		
NOTIFICATIONS/PAGE GROUPS	#1/CEO <input type="checkbox"/> #2/DGM &BELOW <input checked="" type="checkbox"/>	
ADDITIONAL NOTIFICATIONS MADE BY PHONE	MAC	
APPROVED BY	NAME	CLICK TO SIGN

Attachment 2 – Page 2 of 3.

View Approved Incident Report

REPORT APPROVED BY SUPT. OR ASST
SUPT.

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Attachment 3 – Page 3 of 3.

Appendix C – Office of Car Maintenance (CMNT) Work Order Details



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

Page 1 of 3
MX76PROD

Work Order #: 17141050
Type: CM



Status: CLOSE
06/27/2022 09:53

Work Description: FLASING MOL / TRUCKS CUT, 20/4, D01, CMD, MOL, 401
Job Plan Description:

Asset: R3289		3289, RAIL CAR, BRED, 3000 AC, B CAR		Owning Office: CMNT-CMNT-CMNT		Parent:	
Asset Tag: R3289				Maintenance Office: CMNT-WFCH-INSP		Create Date: 06/23/2022 07:42	
Asset S/N: 3289				Labor Group: CMNT		Actual Start: 06/23/2022 07:43	
Location: 2494		K99, WEST FALLS CHURCH YARD		Crew:		Actual Comp: 06/25/2022 21:26	
Work Location: 1213		C99, ALEXANDRIA YARD		Lead:		Item: L18060002	
Failure Class: CMNT006		PROPULSION		GL Account: WMATA-02-33370-50499160-041-*****-OPR**			
Problem Code: 1904		FLASHING MOTOR OVERLOAD		Supervisor: [REDACTED]		Target Start:	
Requested By:				Requestor Phone: [REDACTED]		Target Comp:	
Chain Mark Start:				Chain Mark End:		Scheduled Start:	
Create-Mileage: 2399109.0				Complete-Mileage: 2399165.0			

Task IDs					
Task ID					
10	IN THE YARD VERIFIED FMOL BETWEEN CARS. CHECKED PROPULSION EVENT LOG SHWES MULTIPLE OF CFM2 OVER TEMPERATURE LIMITATION AND TRUCK2 INVERTER OVER TEMPERATURE FAULTS. RAN CFM FAN OK. NEEDS TRAIN IN THE SHOP FOR FURTHER INVESTIGATION. ALSO CHECKED APS FUNCTION AND EVET OK. PER CENV REQUEST DOWNLOAD THE WHOLE CONSIST OF VMS, APS AND PROPULSION EVENT LOG FOR REVIEW. 000-300-D00 SUBSYSTEM; PROPULSION; 2K/3K/6K/				
Component: 7K	Work Accomp: TROUBLE SHOT	Reason: INOPERATIVE	Status: CLOSE	Position:	Warranty?: N
20	VERIFIED F MOL CFM2 LOCK OUT, EVENT LOG SHOW REPEATED CFM1 AND CFM2 OVER TEMP ON 06/21 AND ONLY CFM2 OVER TEMP ON 06/23. FOLLOW CENV RUN LOW VOLTAGE TEST, TEST CFM 1 AND 2 FAN MULTIPLE TIMES ALL GOOD, RESET LPSU AFTER THESE TEST , CHECKED APS EVENT LOG CONFIRM NO APS FAILURE AFTER 06/21 (APS FILURE ON 06/21 WAS FIXED), PROPULSION CFM2 OVER TEMP LOG SHOW APS SIGNAL OK, ONLY MISSING FAN COMMAND SIGNAL, SUGGEST CCU2 NEED R&R AND RUN H/ V TEST AND MLTT AS RECOMMENDED. 000-300-D00 SUBSYSTEM; PROPULSION; 2K/3K/6K/				
Component: 7K	Work Accomp: TROUBLE SHOT	Reason: INOPERATIVE	Status: CLOSE	Position:	Warranty?: N
30	CONTINUED FROM TASK 20 REMOVED AND REPLACED REAR CCU2 PER RECOMMANDATION. THE NEW ONE CAUSE CFM FAN FRONT AND REAR TO RUN CONTINUOUSLY. AT THE SAME TIME THE LPSU HAS NO COMMUNICATION WITH THE FRONT CCU. AFTER INVESTIGATION, FOUND BAD LPSU BY SWAPPING WITH LPSU ON A CAR. REPLACED AGAIN CCU2 AND LPSU, BUT THE NEW LPSU WAS DARK (BAD FROM THE STOCK). NEED ANOTHER LPSU. CCU2: ASSET ON 631892 AND ASSET OFF 661878 LPSU: ASSET ON 777140 AND ASSET OFF 662548 000-300-D00 SUBSYSTEM; PROPULSION; 2K/3K/6K/				
Component: 7K	Work Accomp: REPLACED REBUILT	Reason: FAILED	Status: CLOSE	Position:	Warranty?: N

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10/10/2022 14:34

Attachment 4 – Page 1 of 3.

Incident Date: 06/23/2022 Time: 06:50 hours
Final Report – Improper Rail Vehicle Movement
E22386

Drafted By: SAFE 702 – 10/10/2022
Reviewed By: SAFE 71 – 10/14/2022
Approved By: SAFE 71 – 10/14/2022

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

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MX76PROD

Work Order #: 17141050
Type: CM



Status: CLOSE
06/27/2022 09:53

Work Description: FLASING MOL / TRUCKS CUT, 20/4, D01, CMD, MOLF, 401

Job Plan Description:

Task IDs									
Task ID									
40	CONTINUED FROM TASK 30								
	R/R LPSU AS RECOMMENDED. AFTER INSTALLATION COMMUNICATION TO FRONT CCU WAS RE-ESTABLISHED. NEW SOFTWARE INSTALLED AND NEW WHEEL WEAR SET. RAN LOW VOLTAGE TEST AND PASSED. HIGH VOLTAGED TEST ALSO PASSED. NEED LONG MLTT ASSET ON: 684101 ASSET OFF: 777140								
Component:	000-300-D03-002-001 LOCAL PROPULSION SUPERVISOR UNIT; LPSU; 2K/3K/6K	Work Accomp:	REPLACED REBUILT	Reason:	INOPERATIVE	Status:	CLOSE	Position:	Warranty?: N
50	SEE DEATILS								
	COMPLETED MAIN LINE TRACK TEST FROM ALEX RAIL YARD TO ARLINGTON CEMETARY. TO FRANCONIA STATION, BACK TO ALEX RAIL YARD. DURING MLTT BOTH CFM FAN CONTROL AND INVERTER TEMPERATURE SIGNALS WERE MONITORED AS RECOMMENDED BY CENV. OPS WAS NORMAL AND NO DESCREPCENCYS FOUND. NO FAULTS OCCURRED WITHIN THE PROPSULSION SYSTEM DURING THE TEST. GOOD I/ GOOD DYN. OK FOR SERVICE.								
Component:	000-300-D00 SUBSYSTEM; PROPULSION; 2K/3K/6K/ 7K	Work Accomp:	TRACK TESTED	Reason:	INOPERATIVE	Status:	CLOSE	Position:	Warranty?: N
Planned Materials									
Task ID	Item	Description	Storeroom	Issue Unit	Quantity	Unit Cost	Line Cost		
	M18313045	CONTROLLER:SUPERVISOR PROPULSION,2K, 3K, 6K,CAR	254	EA	1	\$0.00	\$0.00		
	M18313095	UNIT:PROPULSION CLOSE CONTROL,2K, 3K, 6K,CAR	252	EA	1	\$0.00	\$0.00		
	M18313095	UNIT:PROPULSION CLOSE CONTROL,2K, 3K, 6K,CAR	255	EA	1	\$0.00	\$0.00		
	M18313045	CONTROLLER:SUPERVISOR PROPULSION,2K, 3K, 6K,CAR	255	EA	1	\$0.00	\$0.00		
							Total Planned Materials:	\$0.00	
Actual Labor									
Task ID	Labor	Start Date	End Date	Start Time	End Time	Approved?	Regular Hours	Premium Hours	Line Cost
10		06/23/2022	06/23/2022	06:30	10:00	Y	03:30	00:00	\$154.88
20		06/24/2022	06/24/2022	11:00	14:00	Y	03:00	00:00	\$132.75
30		06/24/2022	06/24/2022	15:30	21:00	Y	05:30	00:00	\$231.95
40		06/24/2022	06/25/2022	22:30	02:00	Y	03:30	00:00	\$127.56
50		06/25/2022	06/25/2022	16:00	20:00	Y	04:00	00:00	\$145.79
							Total Actual Hour/Labor:	19:30	\$792.93
Actual Materials									
Task ID	Item	Assetnum	Description	Storeroom	Trans Date	Issue Unit	Quantity	Unit Cost	Line Cost
	M18313045	684101	CONTROLLER:SUPERVISOR PROPULSION,2K, 3K, 6K,CAR	254	06/25/2022	EA	1	\$0.00	\$0.00
	M18313045	777140	CONTROLLER:SUPERVISOR PROPULSION,2K, 3K, 6K,CAR	255	06/24/2022	EA	1	\$0.00	\$0.00

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10/10/2022 14:34

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10/10/2022 14:34

Attachment 5 – Page 2 of 3.

Incident Date: 06/23/2022 Time: 06:50 hours
Final Report – Improper Rail Vehicle Movement
E22386

Drafted By: SAFE 702 – 10/10/2022
Reviewed By: SAFE 71 – 10/14/2022
Approved By: SAFE 71 – 10/14/2022

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

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MX76PROD

Work Order #: 17141050
Type: CM



Status: CLOSE
06/27/2022 09:53

Work Description: FLASING MOL / TRUCKS CUT, 20/4, D01, CMD, MOLF, 401

Job Plan Description:

Actual Materials									
Task ID	Item	Assetnum	Description	Storeroom	Trans Date	Issue Unit	Quantity	Unit Cost	Line Cost
	M18313095	643218	UNIT:PROPULSION CLOSE CONTROL,2K, 3K, 6K,CAR	255	06/24/2022	EA	1	\$0.00	\$0.00
	M18313095	631892	UNIT:PROPULSION CLOSE CONTROL,2K, 3K, 6K,CAR	252	06/24/2022	EA	1	\$0.00	\$0.00
Total Actual Materials:									\$0.00
Related Incidents									
Ticket	Description			Class	Status		Relationship		
8609314	FLASING MOL / TRUCKS CUT, 20/4, D01, CMD, MOLF, 401			SR	CLOSED		ORIGINATOR		
Failure Reporting									
Cause	Remedy			Supervisor			Remark Date		
2349	MATERIAL FAILURE			0004	REPLACED				06/25/2022
Remarks: VERIFIED FMOL, T/S TO DEFECTIVE CCU2 AND LPSU, R/R BOTH, LV AND RPT GOOD. MLTT FROM ALEX YARD TO ... ARLINGTON CEMETARY PERFORMED, GOOD I/DYN. TRAIN OK FOR SERVICE									

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10/10/2022 14:34

Attachment 6 – Page 3 of 3.

Incident Date: 06/23/2022 Time: 06:50 hours
Final Report – Improper Rail Vehicle Movement
E22386

Drafted By: SAFE 702 – 10/10/2022
Reviewed By: SAFE 71 – 10/14/2022
Approved By: SAFE 71 – 10/14/2022

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Appendix D – Office of Radio Communications (COMR) Work Order Details



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

Page 1 of 1
MX76PROD

Work Order #: 17168627
Type: LM



Status: CLOSE
07/05/2022 20:53

Work Description: OSI request for TX & RX by [REDACTED] for D01 both tracks
Job Plan Description:

Work Information									
Asset: COMMMOB COMM, MOBILE RADIO EQUIPMENT				Owning Office: COMM-TSSM-RADO			Parent:		
Asset Tag:				Maintenance Office: COMM-TSSM-RADO			Create Date: 07/04/2022 18:48		
Asset S/N:				Labor Group: COMMR3RADO			Actual Start: 07/05/2022 10:13		
Location: 7698 D01, FEDERAL TRIANGLE, STATION				Crew: COMRADO2			Actual Comp: 07/05/2022 10:13		
Work Location:				Lead: [REDACTED]			Item:		
Failure Class: COMR003 RADIO COMMUNICATIONS SYSTEMS				GL Account: WMATA-02-33540-50499500-042-*****OPR*****					
Problem Code: 3537 INTERFERENCE				Supervisor:			Target Start:		
Requested By: [REDACTED]				Requestor Phone: [REDACTED]			Target Comp:		
Create-Mileage: 0.0				Complete-Mileage: 0.0			Scheduled Start:		
Task IDs									
Task ID									
10 Performed successful radio tests with 3062									
Component: 100-112-201 UHF RADIO SYSTEMS (CRCS) Work Accompl: Reason: Status: CLOSE Position: KE-001 Warranty?: N									
Actual Labor									
Task ID	Labor	Start Date	End Date	Start Time	End Time	Approved?	Regular Hours	Premium Hours	Line Cost
10	[REDACTED]	07/05/2022	07/05/2022	09:00	10:00	Y	01:00	00:00	\$42.59
Total Actual Hour/Labor:							01:00	00:00	\$42.59
Failure Reporting									
Cause	Remedy	Supervisor					Remark Date		
1063 ALIGNMENT PROBLEM	2475 NO DEFECT; NO REPAIRS PERFORMED						07/05/2022		
Remarks: performed successful radio checks both tracks A01--D01									

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Attachment 7 – Page 1 of 1.

Incident Date: 06/23/2022 Time: 06:50 hours
Final Report – Improper Rail Vehicle Movement
E22386

Drafted By: SAFE 702 – 10/10/2022
Reviewed By: SAFE 71 – 10/14/2022
Approved By: SAFE 71 – 10/14/2022

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Appendix E - Root Cause Analysis

E22386 – Improper Rail Vehicle Movement – McPherson Square Station

