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WMSC Commissioner Brief: W-0272 – Derailment – near Farragut North Station – December 18, 2023

Prepared for Washington Metrorail Safety Commission meeting on May 14, 2024

Safety event summary:

During a long-term shutdown of this section of the Red Line under Metrorail's Mobile Command, the Roadway Worker In Charge at the Mobile Command Center instructed Automatic Train Control Maintenance personnel to adjust switches in the Farragut North Station pocket track to be aligned for movement of Prime Mover 46, pushing two flat cars, from Track 1 through the pocket track, to track 2. The switches were realigned for this movement, but the ATC Maintenance crew did not adjust the fixed derailer in this area to align with this movement. Metrorail procedures require the control point to direct personnel to move the derailer to the desired position. This specific instruction did not occur. The ATC Maintenance crew reported the switches were aligned for the intended movement. The consist began to move toward and past a red signal within the work area after communication to do so from the Mobile Command Center. The Flag Person at the lead end of the consist in the direction of travel did not identify that the derailer was in place and aligned to derail the vehicle in this direction of travel. The leading flatcar moved into the derailer and the front truck derailed and struck switch 5B, damaging the switch and the front truck.

After the event, the flag person stated that they were not aware that there is a permanent derailer installed on this pocket track. The flag person also stated the device was covered in dirt and grease. The derailer was not painted with high visibility paint.

The Equipment Operator reported the derailment to Mobile Command. Mobile Command reported the derailment to the on-duty Rail Assistant Operations Manager in the MICC (Rail 2) a few minutes later.

Probable Cause:

The probable cause of this event was the failure to adjust a derailer to align with the switch alignment, conflicting indication of this permanent derailer location to off-site personnel, Metrorail's reliance on Mobile Command personnel designated as a Roadway Worker In Charge despite not being present at the work location, Metrorail's lack of territory familiarization and physical characteristics training and qualification, and insufficient identification by the flag person of the track obstruction (fixed derailer).

Corrective Actions:

Metrorail inspected the derailers in the Farragut North pocket track and ensured it has the intended high-visibility paint and is free of grease. Metrorail inspected the other mainline derailers to ensure the visibility of the yellow paint and to be sure they are free of compounded grease.

The Wayside Work Planning department committed to communicating with source mapping departments to verify and rectify any identified errors when completing long-term shutdown mapping.

Track and Structures communicated to personnel the importance of incorporating a derailer's location into Roadway Job Safety Briefings when operating in that vicinity.

Metrorail provided training for the flag person.

Examples of other related open CAPs

- CAP C-0183 addresses a finding that Metrorail creates safety risks by not requiring and conducting territory familiarization and physical characteristics training, and not assessing knowledge of physical characteristics prior to assigning operations personnel work on a line, in a terminal, or in a yard. (Current scheduled completion September 2025). Metrorail has created physical characteristics training materials and is in the process of rolling out a pilot program to test the efficiency of the materials prior to rolling out organization wide.
- CAPs are in development to address findings from the 2024 ATC audit, including the following related findings:
    - Metrorail ATC Maintenance personnel do not have a uniform understanding of Metrorail procedures, which leads to inadequate completion of safety tasks, such as inspections and handling of vital systems, that are required to ensure that track circuits and other elements of the ATC system function properly as required to prevent train collisions and to provide designed safety protections.
    - Metrorail is not systematically identifying, tracking and mitigating hazards related to automatic train control and signaling as required by its Agency Safety Plan.
- The WMSC is finalizing the draft report of our audit on Metrorail's Roadway Worker Protection Program that began in 2023 and continued into early 2024.

Washington Metropolitan Area Transit Authority
Department of Safety (SAFE)
Office of Safety Investigations (OSI)

FINAL REPORT OF INVESTIGATION A&I E23894

Date of Event:	December 18, 2023
Type of Event:	A-5, Derailment
Incident Time:	05:11 hours
Location:	Farragut North, Track 3
Time and How received by SAFE:	05:40 Hours, Mission Assurance Coordinator (MAC)
WMSC Notification Time:	06:51 Hours
Responding Safety Officers:	WMATA: Office of Operations Safety Oversight (OSO), Office of Emergency Preparedness (OEP)
Rail Vehicle:	Prime Mover (PM) 46
Injuries:	None
Damage:	Minor Vehicle and Infrastructure Damage (Switch 5B)
Emergency Responders:	None
SMS I/A Incident Number:	20231218#113450MX

Farragut North Station – Derailment

December 18, 2023

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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
CM	Chain Marker
CTEM	Car Track Equipment Maintenance
MCC	Mobile Command Center
MOR	Metrorail Operating Rulebook
NOAA	National Oceanic and Atmospheric Administration
OEP	Office of Emergency Preparedness
OSO	Office of Safety Oversight
PM	Prime Mover
RTRA	Office of Rail Transportation
RWIC	Roadway Worker In Charge
SAFE	Department of Safety
SMS	Safety Measurement System
TRST	Office of Track and Structure
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

**Note that all times listed are approximate and may contain minor variations due to differences between systems of record. **

On Monday, December 18, 2023, at 05:11 hours, an incident occurred wherein one of the two flatcars connected to Prime Mover (PM) 46 experienced a derailment at Farragut North Pocket Track 3 Chain Marker (CM) 54+00. This derailment transpired because of colliding with a fixed derailer while attempting to traverse a red signal A02-34.

The Roadway Worker In Charge (RWIC) of the Mobile Command Center (MCC) formally requested the Automatic Train Control Maintenance (ATCM) personnel to secure switches 11B, 11A, 5B, and 5A in the reverse position. This request aimed to facilitate the movement of PM-46 to track 1, utilizing track 3 as the route from track 2. However, the initial ATCM personnel faced a constraint as they had reached their maximum 14-hour limit, preventing them from fulfilling the request. In response, a secondary ATCM work crew was dispatched and manipulated all specified switches into the reverse position.

The Flagman stationed at the Dupont Circle Station end of PM-46 aided the Equipment Operator during the relocation of PM-46 from track 2 at Farragut North Station to track 3. During this maneuver, the flatcar collided with a fixed derailer, resulting in the derailment of the front truck of the flatcar and impacting switch 5B. Measures were implemented to secure PM-46, and the Equipment Operator promptly informed the MCC-RWIC about the derailment incident.

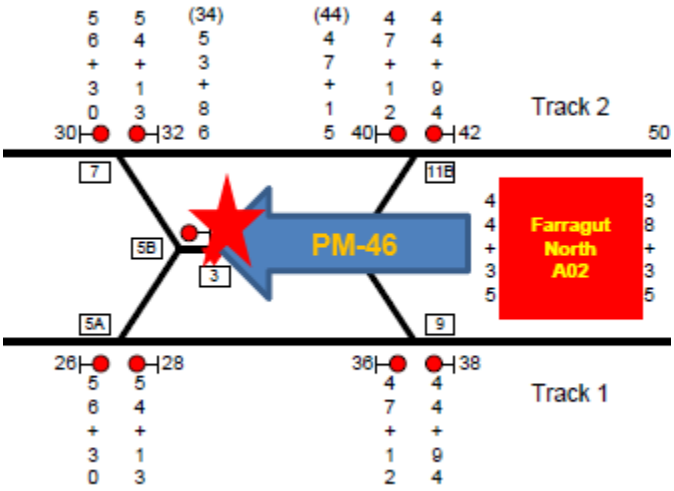
The probable cause of the Derailment event on December 18, 2023, at Farragut North Station, was inattention by ATCM personnel when they failed to move the derailer to the reverse position after adjusting a switch to a reverse position. An additional probable cause was a discrepancy on the Visio Map utilized by MCC-RWIC which did not depict a derailer in the track area, although it was included in the legend.

The proposed Visio map, dated November 16, 2023, does illustrate a derailer at CM 53+86 A02-34 signal, but it is not listed in the legend. This discrepancy in representation suggests a potential inconsistency or oversight in the mapping information.

Incident Site

Farragut North (A02), track 3 – CM 54+00

Field Sketch/Schematics



Approximate incident site and location of derailment marked with a "red star". Diagram not to scale.

Purpose and Scope

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

Investigative Methods

The investigative methodologies included the following:

- Physical Site Assessment

- Formal Interviews – SAFE interviewed one individual as part of this investigation. Interview included persons present at, during, and after the incident, those directly involved in the response process, and representatives from the Washington Metrorail Safety Commission (WMSC). SAFE interviewed the following individual:
    - Flagman

- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information. Written statements were reviewed from personnel present during the event.

- Documentation Review – Collection of relevant work history information and process documentation contained in WMATA systems of record. These records include:
    - Metrorail Operating Rulebook (MOR)
    - National Oceanic and Atmospheric Administration (NOAA)
    - Maximo Data

- System Data Recording Review – Collection of information contained in Metro Data Recording Systems. This data includes:

- Audio Recording System (ARS) playback, including OPS 12 Radio and Phone
- Closed-Circuit Television (CCTV)

Investigation

On Monday, December 18, 2023, at 05:11 hours, one of two flatcars coupled to PM-46 derailed at Farragut North Station, track 3 at CM 54+00 after striking a fixed derailer while attempting to pass a signal A02-34 red.

The Audio Recording System (ARS) records revealed that at 04:56 hours, the MCC-RWIC formally requested ATCM personnel to secure switches 11B, 11A, 5B, and 5A in the reverse position. The purpose of the request was to facilitate the movement of PM-46 to track 1, by utilizing track 3 as the route from track 2. The ATCM personnel faced a constraint as they had reached their maximum 14-hour work limit, preventing them from fulfilling the request.

In response, a secondary ATCM work crew was dispatched and manipulated all specified switches into the reverse position. However, they did not move the derailer into the reverse position after adjusting the switches.

At 05:07 hours, PM-46 was granted an absolute block to CM A1 65+20. The maneuver involved transitioning from track 2 to track 3 and further to track 1, with explicit permission to pass A02-42 and A02-34 signals, both of which were displaying red aspects. It was specified that switches 5A, 5B, 11A, and 11B would be clamped in the reverse position. Notably, there is no recorded repeat back of this instruction.

At 05:11 hours, PM-46 reported to the MCC that a flatcar had collided with a fixed derailer, resulting in the derailment of the front truck of the flatcar and impacting switch 5B. Measures were implemented to secure PM-46.

At 05:15 hours, the MCC notified the Assistant Operations Manager (AOM) of the derailment. The AOM notified the Operations Manager (OM).

At 05:47 hours, the Safety On-Call personnel notified the MAC via landline that they were on the scene.

The Visio Map used by the MICC did not depict a derailer in the track area, although it was included in the legend. The proposed Visio Map dated November 16, 2023, did illustrate a derailer at CM 53+86 A02-34 signal, but it was not listed in the legend.

Chronological Event Timeline

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

Time	Description
04:56:11 hours	MCC: Instructed ATCM to crank and clamp switches 11B, 11A, 5B, & 5A in the reverse position. ATCM: Confirmed switches 11A & 11B were clamped in the reverse position and were headed to switch 5. [Radio OPS 12]
05:06:25 hours	ATCM: Confirmed switches 5A, 5B, 11A, & 11B are clamped in the reverse position. MCC: Acknowledged with 100% repeat back. [Radio OPS 12]

Time	Description
05:07:07 hours	MCC: PM-46 was given an absolute block to CM A1 65+20, turning out from track 2 to track 3 to track 1 with permission to pass A02-42 & A02-34 signals red verifying switches 5A, 5B, 11A, & 11B are clamped in the reverse position. PM-46: *No repeat back was recorded*. [Radio OPS 12]
05:11:07 hours	PM-46: Notified MCC they struck the derailer on track 3, and one truck on the flatcar derailed. MCC: Requested PM-46 exact location. PM-46: They reported they were located at the A02-34 signal. MCC: Acknowledged [Radio OPS 12]
05:15:51 hours	MCC: Notified Rail 2 PM-46 derailed. [Phone]
05:17:08 hours	AOM: Notified OM PM-46 derailed. [Phone]
05:27:10 hours	Button RTC: Received confirmation from OM to operate revenue rail service from Van Ness Station to Shady Grove Station. Shuttle Bus Service from Van Ness Station to Dupont Circle Station. [Phone]
05:40:00 hours	OM: Notified MAC that PM-46 derailed. [Phone]
05:42:12 hours	PM-46: Confirmed no personnel were injured. [OPS 12]
05:43:25 hours	Button RTC: Notified AOM SOC was on the scene, and no injuries were reported. [Phone]
05:47:45 hours	SOC: Notified the MAC that PM-46 derailed at Farragut North Station and reported they were on the scene. [Phone]
05:50:15 hours	TRPM: Requested permission to enter the roadway with a party of five to inspect power cables and rail on track 3. MCC Requested that TRPM contact them via landline due to poor radio communication. [Radio OPS 12]
06:28:10 hours	ATCM: Requested permission to enter track 3 for investigation purposes with a party of four. [Radio OPS 12]

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

Physical Evidence

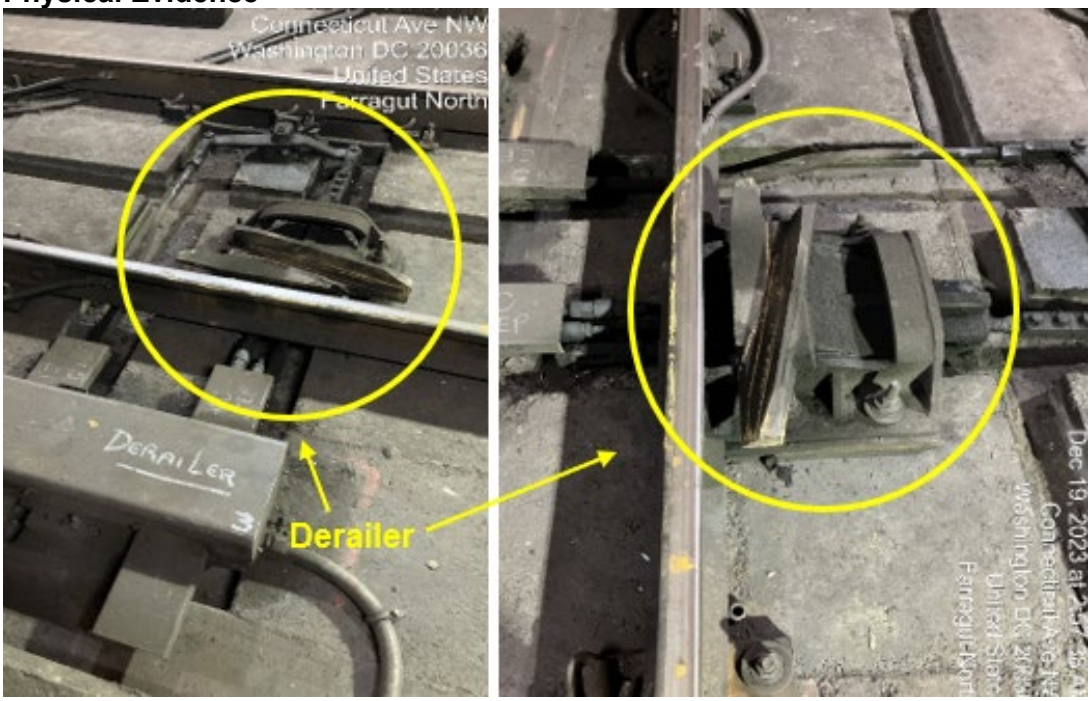


Image 1- depicts two views of the derailer.

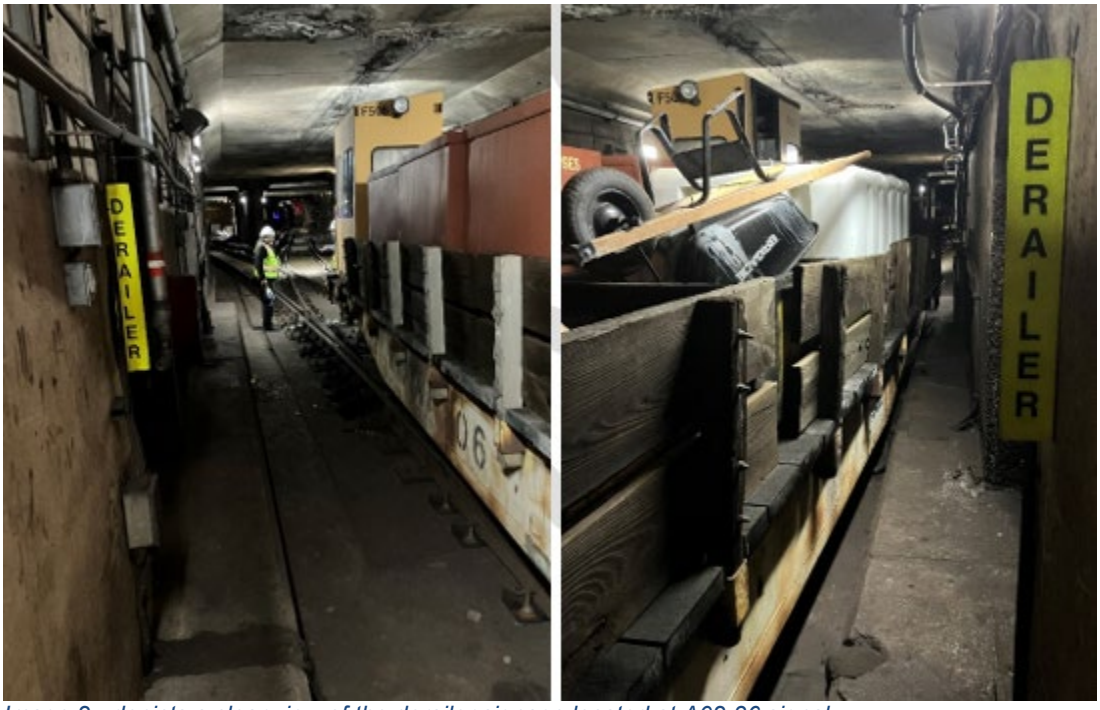


Image 2 - depicts a clear view of the derailer signage located at A02-36 signal.

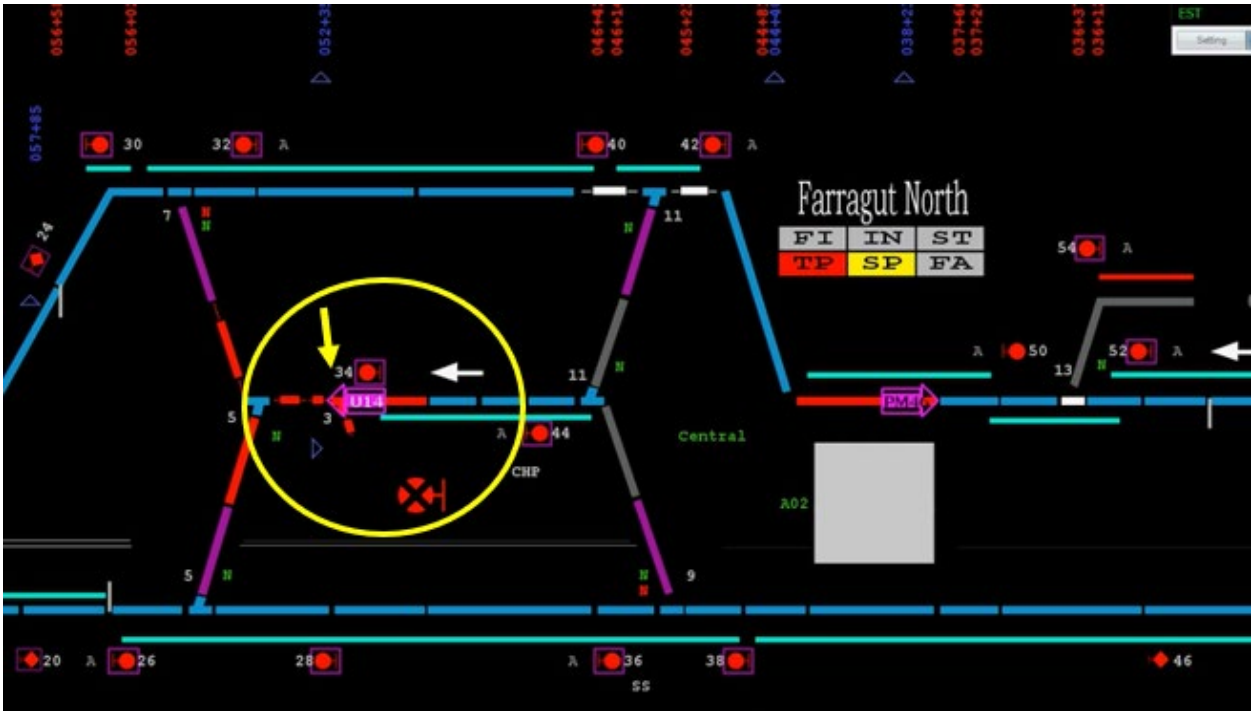


Image 3 - depicts PM-46 derailed at A02-34 signal.

Track and Structures

On December 18, 2023, at approximately 5:11 am, Flat Car 506, being pushed by PM 46, derailed on the pocket track (Track 3) at A02. The incident was placed under investigation by the department and the findings are as follows:

•At the time of derailment, PM 46 was pushing two flat cars from Track 2 to Track 1 via the pocket track. The PM operator was working with the designated flagman who was situated on the lead flat car.

•When units are being pushed, it is the flagman's responsibility to ensure that the roadway is clear of personnel and hazards before units proceed.

•After ATC personnel clamped switches in reverse, Mobile Command gave the operator an absolute block to move the units from the end of the A02 platform (Track 2) to Chain Marker A1 065+20 via the pocket track.

•Upon receiving the block, the operator sounded his horn indicating he was ready to proceed, and the flagman responded that it was clear to proceed by sounding his horn.

•The units turned out from Track 2 to Track 3, proceeding to the 34 Signal when the operator heard a loud bang and immediately stopped the units. The operator then got off the unit and observed that the lead flat car had derailed and radioed Mobile Command.

•It was apparent that the derailment occurred because a fixed derailer on the pocket track was set in the "normal" position rather than "reverse."

•According to the flagman's statements, they were not aware that there was a permanent derailer installed on this pocket track and that he had not seen the device upon approach as it was covered in dirt and grease.

The flagman received disciplinary action and completed flagman reinstruction on 1/24/24.

Interview Findings

As part of the investigation launched into the event, SAFE interviewed one person. The interview identified the following key findings associated with this event. Findings detailed below include reported information from involved personnel and may conflict with other data sources contained in the report.

Flagman

- Stated they heard ATCM clamped for switches to allow them to enter the pocket track.
- Stated the derailer was dirty and not visible.
- Stated PM-46 was moving at a slow speed.
- Stated they were supposed to be stationed on track 1.
- PM-46 was operated from Brentwood Railyard to Farragut North.
- The Flatcar was equipped with a working headlight.
- The Flagman stated they were unaware of a derailer on track 3.

Weather

On December 18, 2023, at the time of the incident, NOAA recorded the temperature as 54°F, with cloudy skies, winds of 20 mph, and 83% humidity. The weather was not a contributing factor in this incident (Weather source: NOAA) – Location: Washington, DC.

Related Rules and Procedures

6.2.1.4 – Confirm that any associated derailer is off the rail and secured (place crank in switch or place reverse auxiliary call on derailer from the RTC or Train Control Room) for desired train or track equipment movement.

6.3 – Hand Cranking a Derailer

6.3.1 - When it is necessary to hand crank a derailer, the RTC shall remotely place or have ATC locally place an auxiliary switch call on the derailer for the desired position.

6.3.2 - Direct qualified wayside personnel by radio to crank the appropriate derailer in the desired position(s). The instruction shall include -
6.3.2.1 Interlocking identification
6.3.2.2 Derailer Number(s)
6.3.2.3 Desired derailer position(s).

6.3.6 - Qualified wayside personnel shall crank the derailer to the required position and confirm that the derailer block is full on the rail for the "normal" position or fully retracted into its cradle for the "reverse" position. Continue to crank the switch until the crank will not turn, this may take about seven more turns of the crank after the derailer stops moving.

Human Factors

Fatigue

Signs and Symptoms of Fatigue

Flagman

SAFE examined signs and symptoms of fatigue that may have been present at the time of the incident. No video of the involved person was available to ascertain whether signs of fatigue were present. The Flagman reported feeling fully alert at the time of the incident. The Flagman reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

Flagman

SAFE evaluated incident data for fatigue risk factors. Risk factors for fatigue were present. The incident occurred at a time of low circadian alertness. The Flagman reported some variation in the sleep schedule in the days leading up to the incident. The Flagman worked the overnight shift in the days leading up to the incident. The Flagman was awake for over 16 hours at the time of the incident, which can increase the likelihood of impairment due to fatigue The Flagman reported ten hours of sleep in the 24 hours preceding the incident. The off-duty period was sixty-four hours and thirty-one minutes which provides an opportunity for 7-9 hours of sleep. This was more than the employee's usual workday sleep durations. The Flagman reported no issues with sleep. The

Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined that the Flagman complied with the Drug and Alcohol Policy and Testing Program 7.7.3/6.

WMATA's Drug and Alcohol Program determined that the Equipment Operator complied with the Drug and Alcohol Policy and Testing Program 7.7.3/6.

Findings

- The derailer on track 3 was permanent; signage was posted and visible. However, the derailer did not have high visibility.[1]
- PM-46 was moved at a slow and regulated speed.
- Switch 5B was damaged, as was the front truck of the flatcar.
- The Winter Shutdown MCC Map shows a derailer on the legend but not on the map. However, the proposed map shows the derailer on the map and not the legend.

[1] High visibility yellow reflective paint.

Drafted By: SAFE 710 – 12/27/2023
Reviewed By: SAFE 707 – 02/26/2024
Approved By: SAFE 707 – 02/26/2024

Immediate Mitigation to Prevent Recurrence

- The Equipment Operator and Flagman were both removed from service of post-incident testing.
- PM-46 was inspected for damage.

Probable Cause Statement

The probable cause of the Derailment event on December 18, 2023, at Farragut North, track 3, was a fixed derailer designed to prevent reverse interlocking moves. The failure occurred when the ATCM did not move the derailer to the reverse position after adjusting the switch into a reverse position. Additionally, The Visio map used by the MCC did not depict a derailer in the track area, although it was included in the legend. The proposed Visio map, dated November 16, 2023, does illustrate a derailer at CM 53+86 A02-34 signal, but it is not listed in the legend. This discrepancy in representation suggests a potential inconsistency or oversight in the mapping information.

Recommended Corrective Actions

Corrective Action Code	Description	Responsible Party	Estimated Completion Date
113450_SAFECAPS_ATCM_001	Mainline derailers at Farragut North, track 3, will undergo an inspection to ensure it has high-visibility paint and is free of grease.	SRC ATCM	Completed
113450_SAFECAPS_WWPL_002	When completing the Shutdown Mapping, initiate communication with the respective source mapping departments to verify and rectify any identified map errors.	WWPL	Completed
113450_SAFECAPS_TRST_003	Establish a lesson learned, recognizing the importance of incorporating the derailer's location into the Roadway Job Safety Briefing when operating within its vicinity.	SRC TRST	03/29/2024
113450_SAFECAPS_ATCM_004	During the 30-day PMIs, conduct an examination of the eight (8) mainline derailers to ensure the visibility of yellow paint and to ensure they are free of compounded grease.	SRC ATCM	Completed
113450_SAFECAPS_TRST_004	Flagman to attend refresher training.	SRC TRST	Completed

Appendices

Appendix A – Interview Summary

The below narratives summarize the incident and represent the statements made by the involved individual. As such, times and details may present a conflict with the data contained in systems of record.

Flagman

The Flagman stated they were waiting on the platform at Farragut North Station while ATCM clamped and blocked the interlocking. The Flagman said they were instructed to move from track 2, through the pocket track 3, to track 1. The Flagman stated they were traveling at 4 MPH when the flatcar stuck the derailer. The Flagman said the derailer was too dirty to recognize. The Flagman stated they received a Roadway Job Safety Briefing before leaving the Brentwood Rail Yard. The flagman stated they operated as flagmen on PM-46 from Brentwood Rail Yard to Farragut North Station track 2, and the flatcar was equipped with a headlight.

Drafted By: SAFE 710 – 12/27/2023
Reviewed By: SAFE 707 – 02/26/2024
Approved By: SAFE 707 – 02/26/2024

Appendix B – MICC ROCC Report

View Approved Incident Report

INCIDENT ID: 2023352RED2

DATE	TIME	LINE	ITEM
2023-12-18	0520	Red	2

LOCATION (STATION/YARD)
Dupont Circle (A03)

LOCATION/CHAIN MARKER (If Applicable)

REPORTED BY
MCC [redacted]

TRAIN ID	DIRECTION	TRACK NUMBER	DEPTS NOTIFIED
PM46	N/A	3	Everbridge Alert/Messaging

CAR NUMBERS (XXXX-XXXX)
Lead Car

-	-	-	-
Caused Issue ☐	Caused Issue ☐	Caused Issue ☐	Caused Issue ☐

TRBL CODE	RESP CODE
DRAL-DERAILMENT	TRK

TYPE INCIDENT
PM46 Derailment A02 Farragut North Pocket track.

ACTION PLAN
Notify Safe and Emergency Personnel.

DELAYS IN MINUTES

LINE	INCIDENT	TRAIN	TOTAL DURATION
0	0	0	0

TRIPS MODIFIED

PARTIAL	GAP TRAIN	LATE DISPATCHES	REROUTED	NOT DISPATCHED	OFFLOADS
0	0	0	0	0	0

FIVE PRIMARY CONSOLE INDICATIONS

BCP	BRAKES ON ILLUMINATED	ALL DOORS CLOSED ILLUMINATED	AUTO\MANUAL ILLUMINATED	BPP
			AUTO	

INCIDENT CHRONOLOGY

TIME	DESCRIPTION
0520	MCC Supervisor [redacted] notified MICC that PM46 had derailed at Farragut North Pocket track. MCC Supervisor [redacted] reported that there were no injuries to report and that the left front of flat car F506 came into contact with the de-railer switch 3 at Farragut North Pocket track. MICC RAIL Assistant Operations Manager, MICC Communication Section, MICC Command Support Section, MTPD and all concerned personnel were notified.

Figure 1 - MICC ROCC report (redacted) page 1 of 2.

View Approved Incident Report

0533	Inbound trains leaving Shady Grove terminating at Van Ness and turning back for service towards Shady Grove due to the late clearing at DuPont Circle. RTRA Supervisor [redacted] dispatched to Van Ness to assist with turning back of trains.
0608	MCC Supervisor [redacted] notified MICC that all personnel were standing by and standing clear of the tracks and that MICC could restore third rail power at DuPont Circle tracks one and two.
0609	Third rail power restoration announcements were made for DuPont Circle tracks one and two.
0648	Train 109 was the first train to service Dupont Circle track two for revenue service in the direction of Shady Grove. Normal service resumed.
0700	Safe 10 is on the scene at A02 Farragut North and the investigation is ongoing.

MAXIMO TICKET#
8718034

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 ☐ #2/DGM &BELOW ■

ADDITIONAL NOTIFICATIONS MADE BY PHONE

APPROVED BY	NAME	CLICK TO SIGN
REPORT APPROVED BY SUPT. OR ASST SUPT.	[redacted]	✓

Figure 2 MICC ROCC report (redacted) page 2 of 2.

Appendix C – GOTRS report

GOTRS - GENERAL ORDERS & TRACK RIGHTS SYSTEM
Track Rights Request

Request Summary

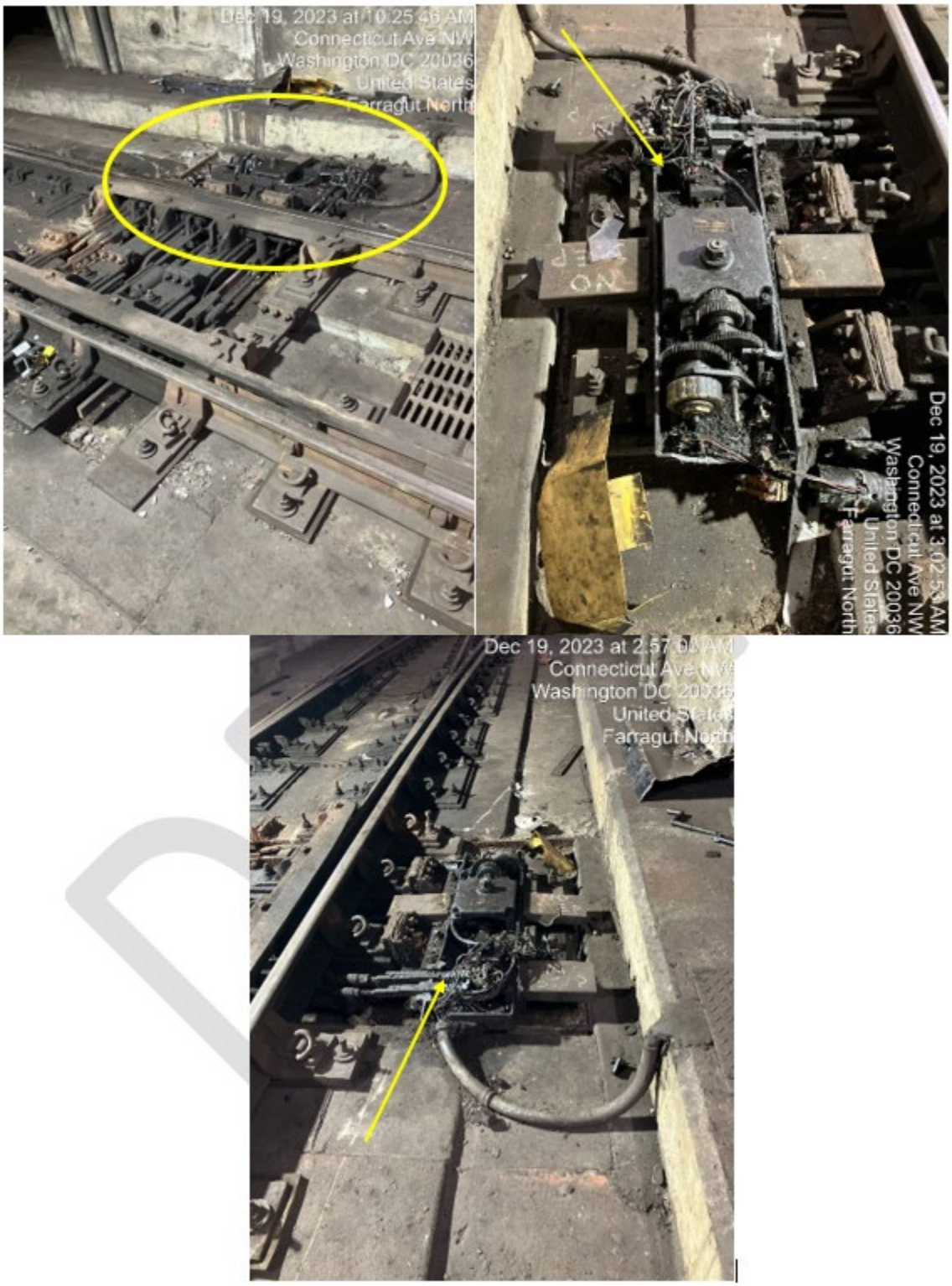
Request Number:	202333802700	**Track Access:**	True
Dates Requested:	12/18/2023 00:00 to: 12/30/2023 06:00	**Clear In Ten:**	False
Request Status:	Opened	**Equipment on Track:**	1
Requestor:	[redacted]	**Allow Piggybacks:**	True
Requestor Organization:	TRST/STRUC	**In Piggyback:**	Yes, Senior
Tag #:	Issued (2023352515-A)	**Power Outage:**	Red Tag
Lock Out / Tag Out:	Yes	**Additional AC:**	ISO PLAN
Request Title:	WINTER SHUTDOWN - Concrete repair		

Piggyback

Request Number	Order	Inherits Rights	Request Status	Piggyback Status	Track	Protected Area Start	Protected Area End
202333802700 WINTER SHUTDOWN - Concrete repair	SR	N/A	Opened	Forced	2	A072+24	B011+22
202333802700 WINTER SHUTDOWN - Concrete repair	SR	N/A	Opened	Forced	3	A046+80	A054+50
202333900800 RSA24-403 A03-B01 Extended Winter Shutdown Fiber Install	JR-4	Yes	Opened	Forced	1	A073+91	B010+94
202333900800 RSA24-403 A03-B01 Extended Winter Shutdown Fiber Install	JR-4	Yes	Opened	Forced	2	A072+24	B011+22
202334602100 OEP Drone Testing @ A02	JR-5	Yes	Approved	Forced	1	B001+00	A049+00
202334602100 OEP Drone Testing @ A02	JR-5	Yes	Approved	Forced	2	B001+00	A049+00

Figure 3 - GOTRS report depicting the protected work area Chain Markers A046+80 to A054+50.

Appendix D – Scene Photographs



Figures 4 is different views of the switch 5 motor damage.

Appendix E – Why-Tree Analysis

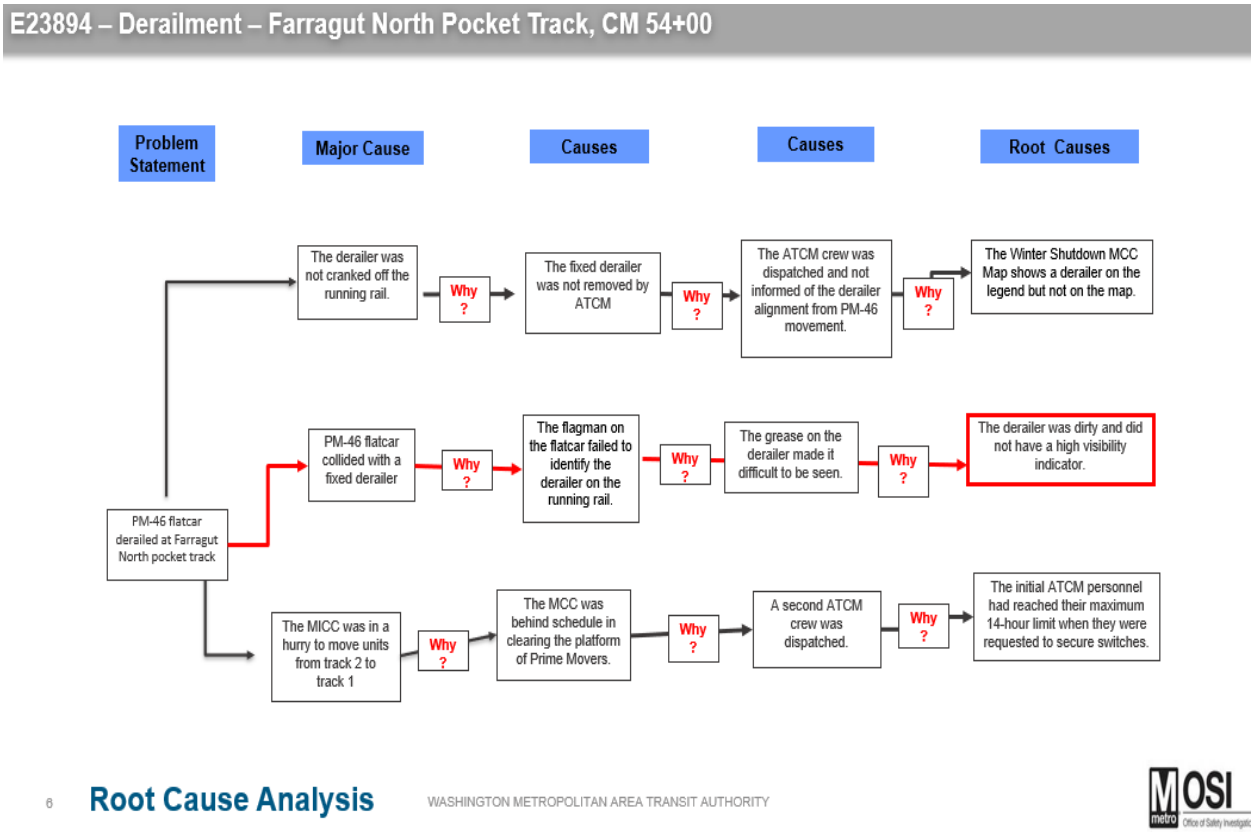


Figure 5 - Root Cause Analysis