



W-0360 – Derailment – near Naylor Road Station – May 17, 2024

Document Purpose:

This WMSC written report on WMATA Metrorail's safety event investigations and review of Metrorail's findings in accordance with the WMSC Program Standard, in conjunction with the attached Metrorail investigation reports that have undergone WMSC staff review and, if necessary, feedback and revision, describes the investigation activities, identifies factors causing or contributing to the safety events, and sets forth ongoing, additional, or upcoming corrective actions and further oversight work (such as inspections and audits) as necessary or appropriate. The WMSC's ongoing oversight during the investigative process, including safety event reporting and verification, participation in investigative interviews, data review, consistent communication with the Metrorail investigations team, and feedback on Metrorail's reports leads to further improvements prior to consideration of the reports by WMSC Commissioners for adoption. The WMSC's safety event investigation oversight assures the sufficiency and thoroughness of Metrorail's investigations. The WMSC Commissioners are considering these documents (the WMSC review and Metrorail's investigation reports) as a unified item for adoption at the Washington Metrorail Safety Commission meeting on March 4, 2025.

WMSC staff recommend adoption of this investigation.

In 2024, Metrorail reported 3 derailments, a decrease from the 7 reported in 2023. Of the 2023 derailments, 1 involved a passenger occupied train and 6 involved roadway maintenance machines (RMM). All 2024 derailment events involved RMMs.

Roadway Maintenance Machines

The WMSC's audit of Metrorail's Maintenance Machine Program, issued on October 18, 2023, demonstrated that while Metrorail has made improvements to its RMM program, Metrorail is not effectively tracking and mitigating hazards related to RMM maintenance and operations. Metrorail has developed and the WMSC has approved corrective action plans to address the audit's five findings and six recommendations. The WMSC continues to review deliverables for these corrective action plans, which have scheduled completion dates through December 2025, and will conduct oversight activities even after the CAPs are closed to ensure the improvements made continue.

Safety event summary:

A Tie Remover and Inserter maintenance vehicle (TR05), also referred to as a Tripp Machine, derailed near Naylor Road Station on Friday, May 17, 2024. Prior to the derailment, the vehicle was traveling at speeds greater than the maximum allowed, in a mode not allowed while the vehicle is traveling. Following the derailment the Equipment Operator did not immediately report the derailment to the Control Center as required by Metrorail policy.

At approximately 1:02 a.m., while transporting TR05 from Alexandria Rail Yard to Branch Avenue Rail Yard on track 2, TR05 experienced difficulty while trying to climb an incline in an elevated curved section of track due to an insufficient amount of torque. The Equipment Operator stopped the unit and switched from travel mode to work mode in an attempt to navigate the curve, causing uneven wheel loading. Travel mode increases stabilization, making it easier to navigate roadway deviations, and is the required mode when an RMM is traveling. The derailment occurred 125 feet after the Equipment Operator entered work mode. Switching between modes to travel through curved inclines is not a



documented practice. When in work mode, Tripp machines are lowered, increasing rigidity and the likelihood of derailment if activated while the unit is traveling.

An investigative review of data determined TR05 was traveling in work mode at approximately 8 miles per hour (mph), 3 mph greater than the maximum speed allowed while operating in that mode when the vehicle derailed. Data also shows that before the incident, at about 1:00 a.m., TR05 was traveling at 18 mph, 3 mph greater than the maximum allowed speed of 15 mph when the vehicle is being operated in travel mode.

At 1:09 a.m., the Equipment Operator contacted a Radio Rail Traffic Controller in the Control Center to request permission to inspect TR05 but did not report an issue or the derailment. The Controller inquired if Foul Time protection was required for the inspection. The Equipment Operator advised that it was not necessary, but advised they needed to speak with an Office of Track and Structures (TRST) Supervisor.

At 1:23 a.m., approximately 14 minutes after the derailment occurred, the TRST Supervisor reported the derailment to the Buttons Rail Traffic Controller via phone.

There were no injuries as a result of this event.

The Equipment Operator was removed from service for post-incident toxicology testing. An inspection of TR05 determined both the front and rear hydraulic drive motors required replacement. The upgrade was completed, and the unit was returned to service.

Post-derailment vehicle inspection

WMATA track department personnel responded to the derailment site and the unit was railed and towed to Branch Avenue Rail Yard for inspection. TR05 had also been involved in a derailment the week prior to this safety incident. Inspection following that incident determined there were no defects or damage and the unit was returned to service. Following this subsequent incident, Metrorail removed all Nordco Tripp Machines from service pending remediation. As a mitigation, Metrorail plans to replace front and rear hydraulic drive motors with larger displacement configurations on all Nordco Tripp Machines to achieve the required torque. The causes and contributing factors include:

- Noncompliance with written operational rules and procedures
 - Operating at excessive speeds
 - Operating in the incorrect mode
 - Failure to report safety incident in timely manner

As a result of this investigation, Metrorail implemented RCAs

- Metrorail developed and tested Equipment Configuration Change (ECC) 2406022 to supply more torque to the wheels to remove the need to enter work mode outside of the work area. TR05 has been upgraded and upon approval all Tripp machines will be upgraded. The remaining units will remain out of service until the hydraulic motor replacements are completed.

Related Open CAPS



- CAP C-0241 addresses the finding that Metrorail is not effectively tracking and mitigating hazards related to RMM maintenance and operations in accordance with its PTASP (Scheduled completion date December 2025).
- CAP C-0244 addresses the finding that Metrorail is not reviewing its RMM-related procedures as required (Scheduled completion date September 2025).

Staff Observation

The operation of roadway maintenance machines in work mode, instead of travel mode, which is the prescribed mode of operation while a RMM is traveling, has either contributed to or been the cause of several derailments in recent years. For example, investigation [W-0207](#), involved a Plasser Tamper derailing twice while incorrectly traveling in work mode. While Metrorail has plans to upgrade Nordco Tripp machines, these incidents demonstrate the need for safety promotion regarding the proper operation of all RMMs to increase safe operations and prevent similar occurrences.



Washington Metropolitan Area Transit Authority
Department of Safety (SAFE)
Office of Safety Investigations (OSI)
FINAL REPORT OF INVESTIGATION A&I E24385

Date of Event:	May 17, 2024
Type of Event:	A-5: Derailment
Incident Time:	01:25 Hours
Location:	Naylor Road Station, track 2
Time and How received by SAFE:	01:28 Hours, Safety Information Officer (SIO)
WMSC Notification Time:	02:55 Hours
Responding Safety Officers:	Office of Emergency Preparedness (OEP) Office of Safety Assurance (OSA)
Rail Vehicle:	Tie Remover and Inserter - Nordco TR05
Injuries:	None
Damage:	None
Emergency Responders:	Metro Transit Police Department (MTPD)
SMS I/A Incident Number:	20240517#116967MX

Naylor Road Station – Derailment

May 17, 2024
Table of Contents

Abbreviations and Acronyms	3
Executive Summary	5
Incident Site	6
Field Sketch/Schematics	6
Purpose and Scope	6
Investigative Methods	6
Investigation	7
Chronological Event Timeline	11
Automated Information Management System (AIMS)	13
Office of Vehicle Program Services, Rail Fleet (CENV)	15
Interview Findings	16
Weather	16
Human Factors	16
Fatigue	16
Post-Incident Toxicology Testing	17
Findings	17
Immediate Mitigation to Prevent Recurrence	17
Probable Cause Statement	17
Recommended Corrective Actions	17
Appendices	18
Appendix A – Interview Summary	18
TRST	18
Appendix B – Written Statements	19
Appendix C – Safe OEP Incident Response Report	22
Appendix D – OSA Investigation Notes	24
Appendix E – Work Orders	25
Appendix F – CTEM Inspection Form	27
Appendix G – CENV Final Report	29
Appendix H - Service Bulletin	34
Appendix I – Photograph	36
Appendix J – Why-Tree Analysis	37

Abbreviations and Acronyms

AIMS	Advance Information Management System
AOM	Assistant Operations Manager
ARS	Audio Recording System
ATCM	Automatic Train Control Maintenance
CM	Chain Marker
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
CENV	Vehicle Program Services
CMOR	Office of the Chief Mechanical Officer
COMR	Office of Radio Communications
CTEM	Car Track and Equipment Maintenance
ECC	Equipment Configuration Change
IIT	Incident Investigation Team
IO	Interlocking Operating
MICC	Metro Integrated Command and Communications Center
MOR	Metrorail Operating Rulebook
MTPD	Metropolitan Transit Police Department
NOAA	National Oceanic and Atmospheric Administration
OAP	Operations Administrative Policy
OEP	Office of Emergency Preparedness
OM	Operations Manager
OSA	Office of Safety Assurance
POD	Point of Derailment
RTC	Rail Traffic Controller

RTRA	Office of Rail Transportation
SAFE	Department of Safety
SIO	Safety Information Officer
SM	Swing Master
SMS	Safety Measurement System
SOP	Standard Operating Procedures
SPOTS	System Performance On-Time Summary
VDMS	Vehicle Monitoring and Diagnostic System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

**Washington Metropolitan Area Transit Authority
Department of Safety – Office of Safety Investigations**

Executive Summary

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

On Friday, May 17, 2024, at 01:25 hours, the Metro Integrated Command and Communication Center (MICC) received a report that Tie Remover and Inserter (TR05) derailed at Naylor Road Station on track 2.

Prior to the incident, on Friday, May 17, 2024, at 23:57 hours, the Equipment Operator of TR05 departed Alexandria Yard transporting TR05 to Branch Avenue Yard on track 2.

At 01:09 hours, the Equipment Operator of TR05 contacted the Radio Rail Traffic Controller (RTC) on Radio OPS3 and advised that they needed to inspect TR05. The Radio RTC inquired if the Equipment Operator needed foul time to inspect TR05, however, the Equipment Operator advised that foul time was not required, but the Equipment Operator of TR05 informed the Radio RTC they needed to speak with their supervisor.

At 01:23 hours, a Track and Structure (TRST) Supervisor contacted the Button RTC via landline and advised that TR05 derailed ascending on track 2, at Chain marker (CM) F2 369+00 traveling at 2 MPH outside the platform limits of the Naylor Road Station.

At 01:28 hours, the Button RTC advised the Assistant Operations Manager (AOM) of the Derailment at Naylor Road Station.

At 01:32 hours, a Track Mechanic Supervisor contacted the Button RTC to request units from Branch Avenue Yard to assist with rerailing and the towing of TR05. Swing Master (SM03) was dispatched from the Branch Avenue Yard to assist.

At 02:24 hours, the Equipment Operator of SM03 advised the Radio RTC that they were in approach to Naylor Road Station. The Radio RTC granted SM03 an absolute block to signal F09-06 red.

At 02:36 hours, the Radio RTC granted SM03 permission to enter the platform limits of Naylor Road Station track 2. The Equipment Operator of SM03 advised that they were holding at CM F2 369+00.

The TRST Supervisor advised the Radio RTC that they were on the roadway awaiting TR05 to be towed by SM03 to the Branch Avenue Yard. At 03:00 hours, the Radio RTC granted SM03 a convoy block on track 2 to the Branch Avenue Yard.

At 03:06 hours, the TRST Supervisor advised the Radio RTC that all units were clear of the roadway, the switches were unclamped, and there was a good track inspection with no damage to equipment or track components.

There were no injuries or damage reported as a result of this event.

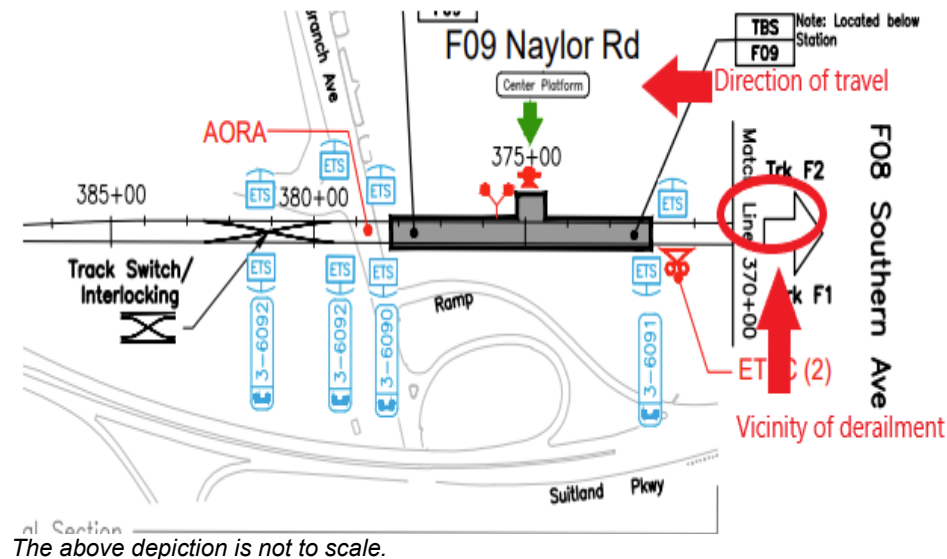
The probable cause of the Derailment event on May 17, 2024, at Naylor Road Station resulted from a wheel climb initiated by TR05 traveling at an excessive speed (more than 5mph) in work mode in a spiral transition curve. A contributing factor is that TR05 does not have enough wheel

torque to negotiate an incline radius while operating in travel mode, which prompted the equipment operator to place TR05 in work mode, causing uneven wheel loading.

Incident Site

Naylor Road Station, track 2, CM F2 369+00.

Field Sketch/Schematics



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

Upon receiving notification of the Derailment event at the Naylor Road Station on May 17, 2024, SAFE dispatched a cross-functional team to assess the scene and conduct the subsequent investigation. SAFE team members worked with relevant WMATA subject matter experts to review the incident's facts and data.

The investigative methodologies included the following:

- Site assessment
- Formal Interviews – SAFE interviewed one (1) individual as part of this investigation. The 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:
 - Equipment Operator – TR05

- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information. Written statements were reviewed by personnel present during the event.
- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
 - Equipment Operator's 30-day work history review
 - Equipment Operator's written statement
 - Metrorail Operating Rulebook (MOR)
 - National Oceanic and Atmospheric Administration (NOAA)
 - Metro Integrated Command and Control (MICC) Incident Report
 - Maximo Data
 - Safety Measurement System (SMS)
 - Vehicle Program Services (CENV)
 - Car Track and Equipment Maintenance (CTEM)
 - Office of Safety Assurance (OSA)
 - Office of Emergency Preparedness (OEP)
 - CENV Incident Report
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback [Radio and Landline Communications]
 - Closed-circuit television (CCTV)
 - Advanced Information Management System (AIMS)

Investigation

On Friday, May 17, 2024, at 23:57 hours, the Equipment Operator of TR05 departed Alexandria Yard, transporting TR05 to Branch Avenue Yard on track 2.



Image 1: Depicts the front of TR05.



Image 2: Depicts the rear of TR05.

At 01:09 hours, the Equipment Operator of TR05 contacted the Radio Rail Traffic Controller (RTC) on Radio OPS3 and advised that they needed to inspect TR05. The Radio RTC inquired if the Equipment Operator needed foul time to inspect TR05, however, the Equipment Operator advised that foul time was not required, but the Equipment Operator of TR05 informed the Radio RTC they needed to speak with their supervisor.

At 01:23 hours, a Track and Structure (TRST) Supervisor contacted the Button RTC via landline and advised that TR05 derailed while ascending on track 2, at chain marker (CM) F2 369+00, traveling at 2 MPH.¹ outside the platform limits of Naylor Road Station.

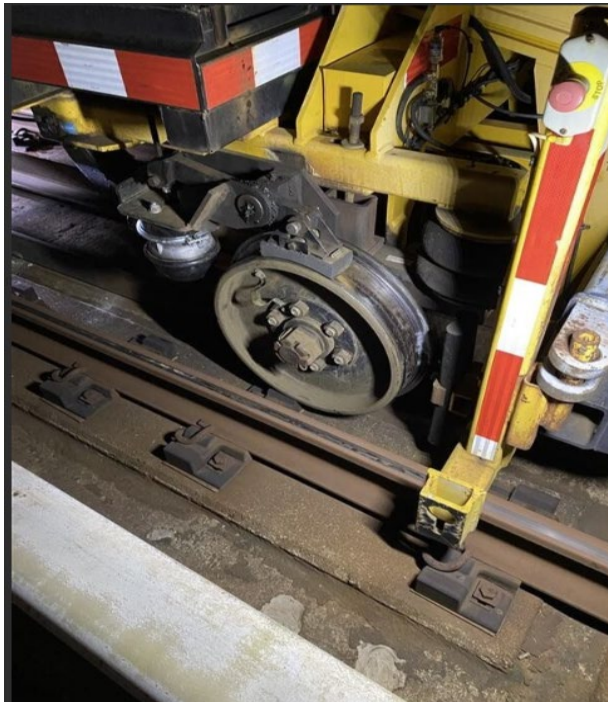


Image 3: Shows TR05 right front wheel that derailed.

¹ According to the CENV Incident and Derailment Report TR-05 was traveling at 7mph prior to the derailment.



Image 4: Shows the Point of Derailment.

At 01:28 hours, the Button RTC advised the AOM of the derailment at Naylor Road Station. The Button RTC notified the Metropolitan Transit Police Department (MTPD) Dispatcher. An MTPD Officer was dispatched to Naylor Road Station. At 01:29 hours, the Button RTC contacted the Power Desk Assistant Superintendent (PDAS) and advised that third rail power would be de-energized at Naylor Road Station track 2 due to the derailment.

Personnel on the scene reported that TR05 traveled approximately 10 feet beyond the point of derailment.

At 01:32 hours, a Track Mechanic Supervisor contacted the Button RTC to request track units from Branch Avenue Yard to assist with rerailling and towing of TR05. SM03 was dispatched from the Branch Avenue Yard to assist.

At 01:59 hours, the TRST Supervisor requested foul time accompanied by seven (7) TRST personnel to enter the roadway at Naylor Road Station, track 2 at CM F2 369+00. The Radio RTC granted foul time. A TRST Superintendent arrived on the scene to assist.

At 02:17 hours, the Office of Emergency Preparedness Primary Responder arrived on the scene.

At 02:24 hours, the Equipment Operator of Swing Master (SM) 03 advised the Radio RTC that they were in approach to Naylor Road Station. The Radio RTC granted SM03 an absolute block to signal F09-06 red.

At 02:28, the TRST Supervisor advised the Radio RTC that switches 1B and 3B were clamped and requested an extension of foul time. The request to extend foul time was granted.

At 02:36 hours, the Radio RTC permitted SM03 to enter the platform limits of Naylor Road Station track 2. The Equipment Operator of SM03 advised that they were holding at CM F2 369+00.

At 02:43 hours, the TRST Supervisor advised the Radio RTC that third rail power was confirmed de-energized and confirmed with the use of a hot stick between CM F2 371+00 and F2 369+00. The TRST Supervisor advised the Radio RTC that they were on the roadway awaiting TR05 to be towed by SM03 to the Branch Avenue Yard.

At 02:54 hours, the TRST Supervisor advised the Radio RTC that TR05 was re-railed and awaiting the convoy to Branch Avenue Yard.



Image 5: Shows SM03 assisting with the re-railing of TR05.

At 02:58 hours, an Office of Emergency Preparedness (OEP) Primary Responder granted the Event Scene Release.

At 03:00 hours, the Radio RTC granted the Equipment Operator SM03 a convoy block to Branch Avenue Yard.

At 03:06 hours, the TRST Supervisor advised the Radio RTC that all units were clear of the roadway, the switches were unclamped, there was a good track inspection, and no damage was reported. At 03:08 hours, the TRST Supervisor relinquished foul time.



Image 6: Shows TRST personnel cleared the roadway at 03:01 hours.

At 03:25 hours, the SM03 Equipment Operator advised the Radio RTC that they arrived at Branch Avenue Yard with TR05 and were clear of mainline.

An investigation conducted by Vehicle Program Services (CENV) revealed that TR05 transitioned from travel mode into work mode and traveled approximately 125 feet before the derailment occurred. At the time of the incident, TR05 was moving forward at approximately 7 MPH with the forward propel engaged.

Chronological Event Timeline

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

Time	Description
23:57:46 hours	<u>Radio RTC</u> : TR05 departed Alexandria Yard and was instructed to verify C98-32 and cross over track 1-yard lead with an absolute block to C97-12 red signal. <u>TR05</u> : Acknowledged. [Radio OPS3]
01:02:40 hours	<u>TR05</u> : Brakes were applied and switched to work mode. [CENV Incident Report]
01:02:47 hours	<u>TR05</u> : Resumed moving. [CENV Incident Report]
01:03:08 hours	<u>TR05</u> : Reached 8 MPH, and the service brakes were applied. [CENV Incident Report]
01:03:11 hours	<u>TR05</u> : Came to a complete stop. [CENV Incident Report]
01:09:55 hours	<u>TR05</u> : Requested permission to check out the unit at CM F2 369+00. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
01:17:07 hours	<u>Radio RTC</u> : Advised if TR05 needed foul time. <u>TR05</u> : TR05 denied needing foul time. [Radio OPS3]
01:18:01 hours	<u>Radio RTC</u> : Instructed TR05 to give the Button RTC a landline. <u>TR05</u> : Acknowledged. [Radio OPS3]
01:23:36 hours	<u>TRST Supervisor</u> : Reported the derailment to the Button RTC. <u>Button RTC</u> : Acknowledged. [Phone OPS3]
01:25:42 hours	<u>Button RTC</u> : Reported the incident to the MOC. <u>MOC</u> : Acknowledged. [Phone OPS3]
01:26:06 hours	<u>RAIL1</u> : Advised Metro1 of the incident. <u>Metro1</u> : Acknowledged. [RAIL1 Phone]
01:27:21 hours	<u>Metro1</u> : Advised the SIO of the incident.

	<u>SIO</u> : Acknowledged. [Metro1 Phone]
01:28:09 hours	<u>Button RTC</u> : Advised RAIL2 of the incident. <u>RAIL2</u> : Acknowledged. [Phone OPS3]
01:29:21 hours	<u>Button RTC</u> : Advised MTPD of the incident. <u>MTPD</u> : Acknowledged. [Phone OPS3]
01:29:55 hours	<u>Button RTC</u> : Advised PDAS they were de-energizing third rail power at Naylor Road Station. <u>PDAS</u> : Acknowledged. [Phone OPS3]
01:31:20 hours	Third rail power was de-energized. [AIMS]
01:32:50 hours	<u>Track Mechanic Supervisor</u> : Requested units to tow TR05. <u>Button RTC</u> : Acknowledged. [Phone OPS3]
01:41:25 hours	<u>Radio RTC</u> : Instructed TR05 to landline METRO1. <u>TR05</u> : Acknowledged. [Radio OPS3]
01:43:52 hours	<u>TR05</u> : Landlines Metro1. [Cellular]
01:52:00 hours	MTPD arrived on the scene. [CCTV]
01:58:00 hours	TRST arrived on the scene. [CCTV]
01:59:39 hours	<u>TRST Supervisor</u> : Requested foul time for 7 TRST personnel to enter the roadway on track 2. <u>Radio RTC</u> : Acknowledged and granted foul-time. [Radio OPS3]
02:01:22 hours	<u>TRST Assistant Supervisor</u> : Advised they are on scene. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
02:02:00 hours	TRST entered the roadway. [CCTV]
02:17:00 hours	<u>OEP Primary Responder</u> : Arrived on the scene. [CCTV]
02:24:34 hours	<u>Equipment Operator of SM03</u> : Advised the Radio RTC that they were arriving at Naylor Road Station. <u>Radio RTC</u> : Granted an absolute block track 2 to Naylor Road Station. [Radio OPS3]
02:28:16 hours	<u>TRST Supervisor</u> : Advised they have clamped 1B and 3B switches and requested to extend foul time. <u>Radio RTC</u> : Acknowledged and granted foul time. [Radio OPS3]
02:36:53 hours	<u>Equipment Operator of SM03</u> : Radio RTC granted SM03 permission to enter the platform limits of Naylor Road Station. [Radio OPS3]
02:40:17 hours	<u>Equipment Operator of SM03</u> : Advised they were holding at CM F2 369+00. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
02:43:03 hours	<u>TRST Supervisor</u> : Advised third rail power was confirmed de-energized and confirmed with a hot stick between CM F2 371+00 and F2 369+00. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
02:54:36 hours	<u>TRST Supervisor</u> : Advised TR05 was re-railed and was awaiting the convoy to Branch Avenue Yard. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
02:58:00 hours	<u>OEP Primary Responder</u> : Granted the Event Scene Release to TRST. [On scene]
03:00:30 hours	<u>TRST Supervisor</u> : Requested permission to move TR05 and SM03 to the Branch Avenue Yard. <u>Radio RTC</u> : Granted Equipment Operator of SM03 a convoy block on track 2 to Branch Avenue Yard. [Radio OPS3]
03:05:56 hours	<u>Equipment Operator of SM03</u> : Confirmed clearing F09-06 signal. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]

03:06:20 hours	<u>TRST Supervisor</u> : Advised that all units have cleared the roadway - switches were unclamped - and a good track inspection with no damage to equipment or track components. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
03:08:21 hours	<u>TRST Supervisor</u> : Relinquished foul time and advised that all personnel were clear of the roadway. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
03:18:43 hours	<u>Radio RTC</u> : Advised that third rail power has been reenergized from Naylor Rd to Anacostia track 2. [Radio OPS3]
03:25:46 hours	<u>Equipment Operator of SM03</u> : Advised they were at Brach Avenue Yard with TR05 track 2 and will be switching to the Branch Yard [Radio BA YD]. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]
03:31:17 hours	<u>Equipment Operator of SM03</u> : Advised they arrived at the Branch Avenue Yard with TR05. <u>Radio RTC</u> : Acknowledged. [Radio OPS3]

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

Automated Information Management System (AIMS)



Figure 1: Shows TR05 arriving at Naylor Road Station.

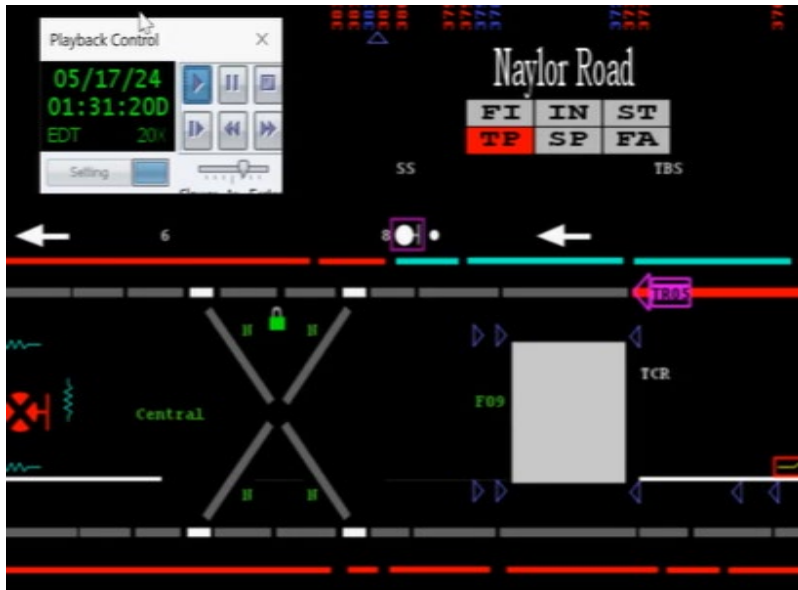


Figure 2: Shows 3rd power de-energized at 01:31 hours.

Office of Internal Business Operations (IBOP), Information Technology (IT)

The IBOP IT performed occupancy data analysis for TR05 on track 2 from F08 to F09 right after 01:00 hours on Friday, May 17, 2024. In the several minutes preceding the derailment, TR05 was moving at 18MPH near CM F2-358 at 1:03:40 hours, it began slowing down, and it stopped occupying blocks F2-364 and F2-368 right around 01:05 hours.

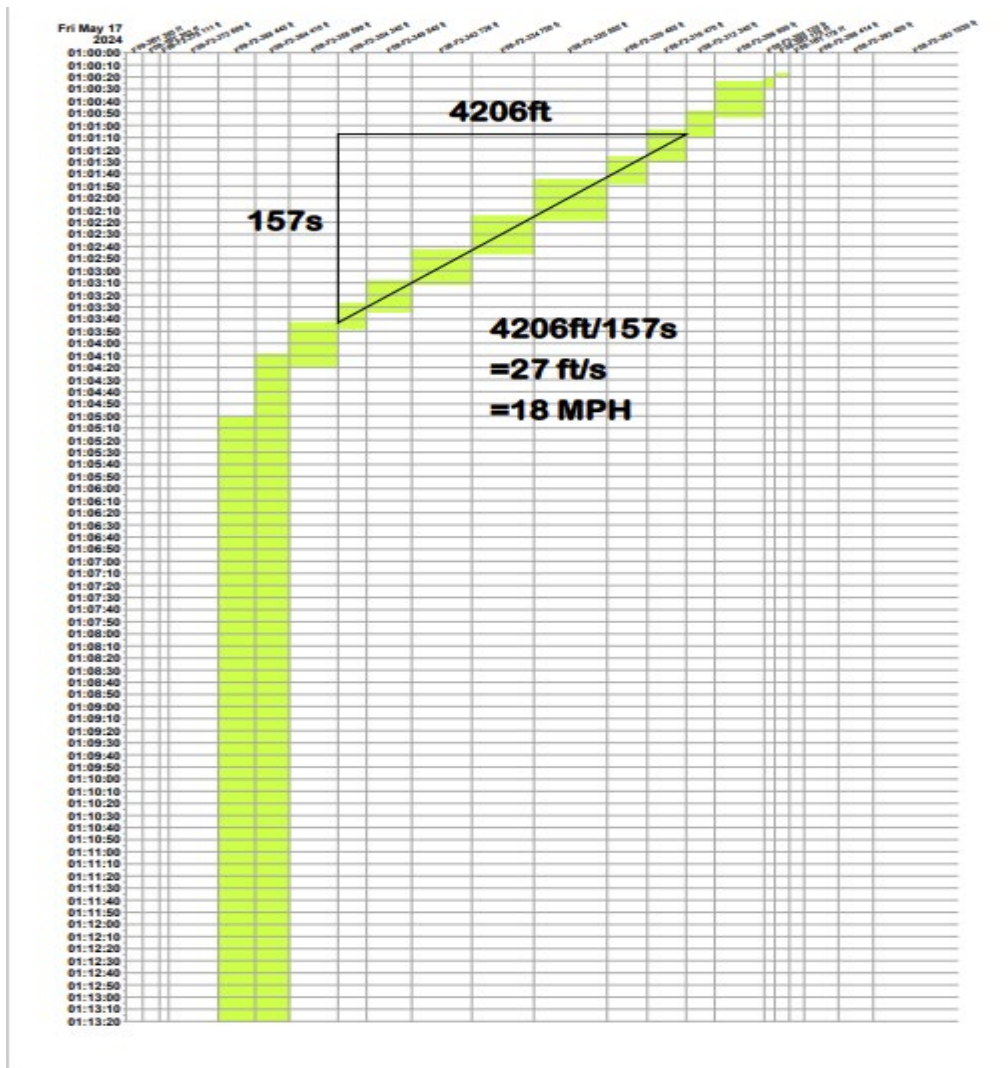


Chart 1: IBOP IT Speed calculation chart.

Office of Vehicle Program Services, Rail Fleet (CENV)

CENV determined that TR05 could not negotiate the inclined radius while in Travel mode. This is likely due to vehicle dynamics while operating within the track area requiring more tractive effort than could be supplied. The hill load, plus the frictional load from the curving and wheel scrub, is greater than the vehicle’s propulsion can provide. Once the vehicle was switched to Work Mode, the frame rigidity caused uneven wheel loading. This reduces the frictional forces (wheel scrub), allowing the vehicle to continue to move. At the same time, the unloaded wheel is susceptible to a flange climb. If the conditions where the derailment occurred are considered, specifically the vehicle climbing a grade while on a right-hand spiral transition to a tangent track, that condition would allow for an unloading of the left front wheel (the curves outside the front wheel). Compared to the actual derailment, this is precisely the circumstances found.

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. The findings detailed below include reported information from involved personnel and may conflict with other data sources contained in the report.

Equipment Operator – TR05

- The Equipment Operator stated they were transporting TR05 from Alexandria Yard to Branch Avenue Yard.
- The Equipment Operator stated that they were ascending uphill in a curve with the unit in travel mode on track 2 when TR05 derailed.
- The Equipment Operator was familiar with TR05.

Weather

On May 17, 2024, at the time of the incident, NOAA recorded the temperature as 62.2°F, mostly cloudy, with 5 MPH winds, and 85% humidity. Weather was not a contributing factor in this incident (Weather source: NOAA) – Location: [Camp Springs/Andrews Air Force Base, MD].

Human Factors

Fatigue

Equipment Operator – TR05

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 Equipment Operator reported feeling fully alert at the time of the incident. The Equipment Operator reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

Equipment Operator – TR05

SAFE evaluated incident data for fatigue risk factors. No significant risk was identified. The incident time of day did not suggest an increased risk of fatigue-related impairment. The Equipment Operator reported keeping a regular sleep schedule in the days leading up to the incident. The Equipment Operator worked the overnight shift in the days leading up to the incident. The Equipment Operator was awake for nine hours and twenty-five minutes at the time of the incident. The Equipment Operator reported eight hours of sleep in the 24 hours preceding the incident. The off-duty period was seventeen hours, which provided an opportunity for 7-9 hours of sleep. The Equipment Operator reported no issues with sleep.

Post-Incident Toxicology Testing

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

Findings

- TR05 departed from Alexandria Yard traveling outbound to Branch Avenue Yard, track 2 for planned track maintenance within an established work zone.
- TR05 was traveling uphill on a curve.
- TR05 while operating in travel mode came to a complete stop and was switched to work mode.
- TR05 derailed 125 feet after transitioning from travel mode to work mode.
- The Equipment Operator requested permission from the Radio RTC to inspect the unit however failed to report that TR-05 derailed at Naylor Road Station.
- TR-05 was involved in two (2) derailments in 30 days.
- No equipment or components were damaged.
- TR05 was transported to Branch Avenue Yard for inspection by SM03.
- All of the Tripp Machines are currently in service. TR05 is currently at C99.

Immediate Mitigation to Prevent Recurrence

- TR05 Equipment Operator was removed from service for post-incident testing.
- TR05 was removed from service for post-incident inspection.
- All Nordco Tripp Machines were removed from service pending investigation.

Probable Cause Statement

The probable cause of the Derailment event on May 17, 2024, at Naylor Road Station resulted from a wheel climb initiated by TR05 traveling at an excessive speed (more than 5mph) in work mode in a spiral transition curve. A contributing factor is that TR05 does not have enough wheel torque to negotiate an incline radius while operating in travel mode, which prompted the equipment operator to place TR05 in work mode, causing uneven wheel loading.

Recommended Corrective Actions

Corrective Action Code	Description	Responsible Party	Estimated Completion Date
116966_SAFE CAPS_CENV _001	CENV will develop and test Equipment Configuration Change (ECC) 2406022 to supply more torque to the wheels to remove the need to enter Work mode outside of the work area.	CENV SRC	10/31/2024

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.

TRST

Equipment Operator-TR05

Equipment Operator has been employed with the Authority since January 21, 2020, and certified as an Equipment Operator A on November 7, 2023. They had no other safety incidents since the certification. The Equipment Operator holds a Roadway Worker Protection (RWP) 2 that expires on May 24, 2024.

The Equipment Operator stated their duties for the day were to transport TR05 from the Alexandria Yard to the Branch Avenue Yard. The Equipment Operator stated while traveling uphill in a curve on track 2, with the unit in travel mode, TR05 came up off the rail. After TR05 would not move The Equipment Operator stated they placed the unit in work mode but were still unsuccessful with moving TR05. The Equipment Operator stated they notified the Radio RTC and requested to check out TR05. The Equipment Operator stated at the time of the derailment TR05 was traveling at 2 MPH and the point of derailment was between 2-3 feet.

Appendix B – Written Statements

M Initial Incident Form		TO BE COMPLETED AND DISTRIBUTED WITHIN 24 HOURS		Page 1 of
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY				
INCIDENT				
Date 05/17/24	Incident Time 1:06	<input checked="" type="checkbox"/> AM <input type="checkbox"/> PM	Date/Time Reported 1:06	<input checked="" type="checkbox"/> AM <input type="checkbox"/> PM
Location T35 METRO SUPPLY FACILITY 8201 ARDWICK-ARDMORE DR. LANDOVER, MD 20786			Worksafe Incident ID#	
Incident ID# (From ROCC, BOCC, etc.)				
Type of Incident: <input type="checkbox"/> Altercation <input type="checkbox"/> External Complaint <input type="checkbox"/> Gas Detection Alarm <input type="checkbox"/> Medical Treatment <input type="checkbox"/> Vandalism <input type="checkbox"/> Assault <input type="checkbox"/> Fatality <input type="checkbox"/> Hazardous Material <input type="checkbox"/> Near Miss <input type="checkbox"/> Other: _____ <input checked="" type="checkbox"/> Derailment <input type="checkbox"/> Fire <input type="checkbox"/> Handling <input type="checkbox"/> No Treatment <input type="checkbox"/> Elevator Entrapment <input type="checkbox"/> First Aid Case <input type="checkbox"/> Internal Complaint <input type="checkbox"/> Rupture or Spill <input type="checkbox"/> Escalator <input type="checkbox"/> Flood <input type="checkbox"/> Leak <input type="checkbox"/> Trespassing				
WMATA PERSONNEL INVOLVED				
Name	Age	Employee # or MTPD Badge #		
Phone Number	Job Title	Department	Division/Section	
Last Day Worked (prior to)	Hours Worked (within last 24 hrs)	Overtime?		
5/15/24	8	NO		
COMPLETE FOR INCIDENTS WITHIN THE RAIL SYSTEM:				
Train/Vehicle ID TR05	Direction out	Track # 2	Car/Vehicle Numbers	Trouble Code
Mezzanine #	AFC Equipment #	Escalator/Elevator #	Entrance	Platform
		Track	Room#	
COMPLETE FOR INCIDENTS WITHIN THE BUS SYSTEM				
Bus or Tag Number	Vehicle or Tag Number	Block Number	Run Number	
DESCRIBE THE INCIDENT AND PROPERTY/EQUIPMENT DAMAGE				
Provide factual information about the task, actions before and after the incident, the injury causing agent and any damage caused to property or equipment. Provide a diagram(s) and/or photos as attachments. If necessary, provide diagram in this space or on a separate page.				
operating trip on Tr-2 towards Branch. uphill out of curve it derailed. NO Equipment or property Damage				
EXTERNAL AGENCIES INVOLVED				
<input type="checkbox"/> Fire Dept. – Arrival Time: _____		<input type="checkbox"/> EMS. – Arrival Time: _____		
<input type="checkbox"/> Police – Arrival Time: _____		<input type="checkbox"/> Other _____ – Arrival Time: _____		
Name	Badge Number	Complaint Number	Jurisdiction	
Engine Number	Ambulance Number	Hospital		
ACTIONS TAKEN BY SUPERVISOR:				
Describe immediate changes made to address the incident.				
Form completed by (Print name)				
[Redacted]			Date	5/17/24
Supervisor (Signature)			Employee Number	[Redacted]
[Redacted]			Date	5/17/24
[Redacted]			Employee Number	[Redacted]
[Redacted]			Phone Number	[Redacted]

50.689 04/09 Original: RISK Copy 1: Kosk Copy 2: Department Photocopy to SAFE, Employee and other per Department requirements

Document 1: Equipment Operator of TR05 written statement. Page 1 of 3

Incident Date: 5/17/2024 Time: 01:25 hours
 Final Report – Derailment- Rev 1
 E24385

Drafted By: SAFE 706 – 08/04/2024
 Reviewed By: SAFE 702 – 08/04/2024
 Approved By: SAFE 707 – 08/04/2024

INCIDENT				
Incident #		Risk Rank	Today's Date 5/17/24	
Incident Date 5/17/24	Incident Time 1:06 A.M.	Department TRST	Division	Work Area
Location where Incident Occurred: F2 369+00				
Is this the final report? If YES, is it within 7 days of the incident?				
If this is the Final Report, but it wasn't completed within 7 days, please explain why it wasn't completed within 7 days:				

DESCRIPTION OF THE INCIDENT.
 Briefly describe the incident.

I was operating TR05 up a hill & out of a curve. maybe 2.5 Mph & the trip Derailed.

KNOWN FACTS.
 List in a logical order the known facts obtained during the investigation process.

50.690 1/3 02/10 Original: RISK Copy 1: Department Copy 2: SAFE Copy 3: LSC-I&II

Document 2: Equipment Operator of TR05 written statement. Page 2 of 3

Incident Date: 5/17/2024 Time: 01:25 hours
 Final Report – Derailment- Rev 1
 E24385

Drafted By: SAFE 706 – 08/04/2024
 Reviewed By: SAFE 702 – 08/04/2024
 Approved By: SAFE 707 – 08/04/2024



Incident Investigation Form

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

INJURY CAUSING AGENT (MARK ONLY ONE)

<input type="checkbox"/> Absorbed Hazardous Substance	<input type="checkbox"/> Contacted Electric Current	<input type="checkbox"/> Lifting	<input type="checkbox"/> Struck by
<input type="checkbox"/> Asphyxiation	<input type="checkbox"/> Contacted Extreme Temperature	<input type="checkbox"/> Over Exertion	<input type="checkbox"/> Swallow Hazardous Substance
<input type="checkbox"/> Assault	<input type="checkbox"/> Exposure	<input type="checkbox"/> Physical Altercation	<input type="checkbox"/> Other
<input type="checkbox"/> Awkward Positions/Static Posture	<input type="checkbox"/> Foreign Object in Eye	<input type="checkbox"/> Repetitive Motions/Cumulative Trauma	<input type="checkbox"/> Witnessed Event
<input type="checkbox"/> Bite	<input type="checkbox"/> Harassment	<input type="checkbox"/> Slip, Trip or Fall	
<input type="checkbox"/> Biological Substance	<input type="checkbox"/> Illness	<input type="checkbox"/> Strike against	
<input type="checkbox"/> Caught In/On/Between Object	<input type="checkbox"/> Inhaling Hazardous Substance		

EQUIPMENT (MARK ALL WMATA EQUIPMENT DIRECTLY INVOLVED IN INCIDENT)

<input type="checkbox"/> Access Platforms	<input type="checkbox"/> DC Systems	<input type="checkbox"/> Hand Rails	<input type="checkbox"/> Radios	<input type="checkbox"/> Transformers
<input type="checkbox"/> Automobile	<input type="checkbox"/> Detection Systems (i.e. Fire, Gas)	<input type="checkbox"/> Hand Tools	<input type="checkbox"/> Rigging	<input type="checkbox"/> Truck
<input type="checkbox"/> Ballast Car	<input type="checkbox"/> Diesel	<input type="checkbox"/> Heaters	<input type="checkbox"/> Riser Guard	<input type="checkbox"/> Utility Air
<input type="checkbox"/> Ballast Regulator	<input type="checkbox"/> Drain Machine	<input type="checkbox"/> High Pressure Washdown	<input type="checkbox"/> Scaffolds	<input type="checkbox"/> Walls or Fences
<input type="checkbox"/> Bath or Toilet Facilities	<input type="checkbox"/> Elevator	<input type="checkbox"/> HVAC	<input type="checkbox"/> Separators	<input type="checkbox"/> Winch, Hoist, Chain Fall
<input type="checkbox"/> Blowdowns	<input type="checkbox"/> Escalator	<input type="checkbox"/> Ladders	<input type="checkbox"/> Speed Swing	<input type="checkbox"/> Other
<input type="checkbox"/> Blowers or Fans	<input type="checkbox"/> Exchangers	<input type="checkbox"/> Lighting	<input type="checkbox"/> Stairs or Ladders	
<input type="checkbox"/> Boom Truck	<input type="checkbox"/> Filtration	<input type="checkbox"/> Microwaves	<input type="checkbox"/> Surface Grinder	Activity In Progress
<input type="checkbox"/> Buildings	<input type="checkbox"/> Flat Car	<input type="checkbox"/> Motor Controllers	<input type="checkbox"/> Switch Gear	<input type="checkbox"/> Maintenance
<input type="checkbox"/> Bus	<input type="checkbox"/> Forklift	<input type="checkbox"/> Motors	<input type="checkbox"/> Tamper	<input type="checkbox"/> Normal
<input type="checkbox"/> Compressors	<input type="checkbox"/> Generator	<input type="checkbox"/> PA System	<input type="checkbox"/> Tanks	<input type="checkbox"/> Emergency
<input type="checkbox"/> Control Hardware or Software	<input type="checkbox"/> Geismer	<input type="checkbox"/> Power Tools	<input type="checkbox"/> Telephones	<input type="checkbox"/> Start-Up
<input type="checkbox"/> Crane	<input type="checkbox"/> Guards Or Barriers	<input type="checkbox"/> Prime Mover	<input checked="" type="checkbox"/> Tie Inserter	
		<input type="checkbox"/> Pumps	<input type="checkbox"/> Towers	

EMPLOYEE INJURY (MARK ONLY ONE)

<input type="checkbox"/> Amputation	<input type="checkbox"/> Cut	<input type="checkbox"/> Fracture	<input type="checkbox"/> Loss of Sense	<input type="checkbox"/> Strain	<input type="checkbox"/> Multiple Injuries
<input type="checkbox"/> Bruise	<input type="checkbox"/> Concussion	<input type="checkbox"/> Illness	<input type="checkbox"/> Poisoning	<input type="checkbox"/> Shock	<input checked="" type="checkbox"/> No Physical Injury
<input type="checkbox"/> Burn	<input type="checkbox"/> Dislocation	<input type="checkbox"/> Internal	<input type="checkbox"/> Sprain	<input type="checkbox"/> Other	

BODY PART (MARK PRIMARY BODY PART)

<input type="checkbox"/> Abdomen	<input type="checkbox"/> Back/Lower	<input type="checkbox"/> Feet/Left	<input type="checkbox"/> Head	<input type="checkbox"/> Legs/Left	<input type="checkbox"/> Other
<input type="checkbox"/> Arms/Left	<input type="checkbox"/> Eyes/Left	<input type="checkbox"/> Feet/Right	<input type="checkbox"/> Internal	<input type="checkbox"/> Legs/Right	
<input type="checkbox"/> Arms/Right	<input type="checkbox"/> Eyes/Right	<input type="checkbox"/> Hands/Left	<input type="checkbox"/> Knees/Left	<input type="checkbox"/> Neck	
<input type="checkbox"/> Back/Upper	<input type="checkbox"/> Chest	<input type="checkbox"/> Hands/Right	<input type="checkbox"/> Knees/Right	<input type="checkbox"/> Multiple	

BASIC CAUSES SPECIFY ALL THE UNDERLYING CAUSES CONTRIBUTING TO THE INCIDENT

Design Failures <input type="checkbox"/> Design Management of Change Inadequate <input type="checkbox"/> Ergonomic Design Inadequate <input type="checkbox"/> Guards/Barriers or Safety Devices Inadequate <input type="checkbox"/> Technical Design Inadequate	Maintenance Inadequate <input type="checkbox"/> Adjustment, Assembly or Installation Inadequate <input type="checkbox"/> Housekeeping Inadequate <input type="checkbox"/> Preventive Maintenance Inadequate <input type="checkbox"/> Replacement Parts Used/Were Inappropriate <input type="checkbox"/> Safety Devices Defective <input type="checkbox"/> Servicing Schedule Not Followed <input type="checkbox"/> Wear and Tear Excessive	Tools & Equipment <input type="checkbox"/> Personal Protective Equipment Defective <input type="checkbox"/> Personal Protective Equipment Not Available <input type="checkbox"/> Personal Protective Equipment Not Used or Used Improperly <input type="checkbox"/> Tools and Equipment Defective <input type="checkbox"/> Tools and Equipment Not Available <input type="checkbox"/> Tools and Equipment Used Improperly <input type="checkbox"/> Tools and Equipment Wrong for the Job
Human Factors <input type="checkbox"/> Diminished Capacity Due to Medication <input type="checkbox"/> Fatigue <input type="checkbox"/> Hearing Deficiency <input type="checkbox"/> Impaired Due to Drugs or Alcohol <input type="checkbox"/> Improper Position <input type="checkbox"/> Operating at Improper Speed <input type="checkbox"/> Restricted Range of Motion <input type="checkbox"/> Vision Deficiency	Procedures Failure <input type="checkbox"/> Failure to Warn <input type="checkbox"/> Operating Without Authority <input type="checkbox"/> Prestartup Safety Review Inadequate <input type="checkbox"/> Procedure Inadequate <input type="checkbox"/> Procedure Not Followed <input type="checkbox"/> Procedure Not In Place <input type="checkbox"/> Procedure Not Known or Understood <input type="checkbox"/> Procedure, Instructions or Signage Not Followed <input type="checkbox"/> Procedures Not Updated <input type="checkbox"/> Taking Short Cut	Training <input type="checkbox"/> Assessment of Required Skills Inadequate <input type="checkbox"/> Skills Development Inadequate <input type="checkbox"/> Training Inadequate <input type="checkbox"/> Training Not Provided <input type="checkbox"/> Training Updates Inadequate
Planning Failure <input type="checkbox"/> Appropriate Human Resources Not Available <input type="checkbox"/> Assessment of Hazards & Safe Guards Inadequate <input type="checkbox"/> Documentation Inadequate <input type="checkbox"/> Isolation of Energy Source (LOTO) Inadequate <input type="checkbox"/> Materials Inadequate <input type="checkbox"/> Roles and Responsibilities Not Understood <input type="checkbox"/> Safe Guards Not In Place (i.e. barricades, signs) <input type="checkbox"/> Scheduling Inadequate <input type="checkbox"/> Supervision Inadequate	Communication <input type="checkbox"/> Communication Method Not Available or Inadequate <input type="checkbox"/> Communication Between Shifts Inadequate <input type="checkbox"/> Communication Between Work Groups Inadequate <input type="checkbox"/> Horizontal Communication Inadequate <input type="checkbox"/> Instructions Incorrect <input type="checkbox"/> Vertical Communication Inadequate	Leadership <input type="checkbox"/> Correction of Worksite or Job Hazards Inadequate <input type="checkbox"/> Enforcement of Procedures Inadequate <input type="checkbox"/> Incident Investigation Inadequate <input type="checkbox"/> Management of Change System Inadequate

50.690 2/3 02/10 Original: RISK Copy 1: Department Copy 2: SAFE Copy 3: LSC-1&II

Document 3: Equipment Operator of TR05 written statement. Page 3 of 3

Incident Date: 5/17/2024 Time: 01:25 hours
Final Report – Derailment- Rev 1
E24385

Drafted By: SAFE 706 – 08/04/2024
Reviewed By: SAFE 702 – 08/04/2024
Approved By: SAFE 707 – 08/04/2024

Appendix C – Safe OEP Incident Response Report

Submitted by: [REDACTED]



SAFE OEP Incident Response Report

Overview

<u>Incident Date/Time:</u>	<u>Responder 1:</u>	<u>Additional Responders:</u>
2024-05-17	[REDACTED]	N/A
01:26	<u>MAC 1:</u> [REDACTED]	<u>Incident Type:</u>
<u>Incident Location:</u>	<u>MAC 2:</u> N/A	Derailment
Naylor RD	<u>MAC Log #:</u> 11423	

Incident Metrics

<u>OPS Channel:</u> Rail Ops 3	<u>On Scene Time:</u> 02:17
<u>MTPD Channels:</u>	<u>Disregard Time:</u> N/A
MTPD 1x	<u>Time of Recovery:</u> 01:45
<u>Bus/Rail Yard Channel:</u>	<u>In-Service Time:</u> 02:58
<u>Incident Start Time:</u> 01:26	<u>Command Est. Time:</u> 01:40
<u>PR Dispatch Time:</u> 01:55	<u>Transfer of Command Time:</u> N/A
<u>Response Time:</u> 02:00	

Incident Personnel

Metro IC: [REDACTED]	Maintenance Lead (ERT): N/A
Jurisdictional IC: N/A	Investigations Lead (MTPD):
Fire Liaison ROCC: [REDACTED]	N/A
Transportation Group Supervisor- RAIL:	Investigations Lead (Safety): [REDACTED]
N/A	Transportation Lead (Bus TFS): N/A
Operations Section Chief: N/A	

Document 4: Safe OEP Incident Response Report. Page 1 of 2

Submitted by: [REDACTED]

Incident Overview

Was Power removed: Yes

Red Tag (if applicable):Supervisory

Incident Narrative:

While traveling outbound on track 2 TR05 derailed traversing the incline in approach to the Naylor RD platform. The unit derailed at CM F2 368+70 and traveled approximately 10' before stopping. SM03 arrived and placed the unit back on the rails. The unit was then taken to Branch Ave Yard escorted by SM03.

Incident Successes:

Prompt arrival of responding units and the re-railing of TR05.

Opportunities for Improvement:

This is the second time this unit has derailed in thirty days, the last being at the National Airport. A thorough investigation of this unit should be conducted to ensure that this isn't an issue inherent to this unit.

Document 5: Safe OEP Incident Response Report. Page 2 of 2

Appendix D – OSA Investigation Notes

B3 Derailment – Naylor Rd 5-17-23 01:26 Preliminary Investigation Notes / [REDACTED]

Naylor RD Station TRK 2 CM F2 368+70 on aerial

Incident Commander Call [REDACTED]

Operator [REDACTED] Stated “while proceeding at 2-3 mph TR05 would not climb the slight incline then TR05 came to a stop”. Witnesses on scene verified [REDACTED] statement. [REDACTED] was transported for PME.

TR05 left Branch Avenue in route to Naylor Rd Station. TR05’s front wheels walked the top of the rail for approx. ten feet before derailing approximately 75 yards from the platform at Naylor Rd Station. TR05 and the track was assessed by management on the scene. Preliminary cause of derailment was equipment failure. Reportedly TR05 derailed at National Airport last week. After power was taken down Recovery Unit SM03 rerailed TR05, towed TR05 up the slight incline then both pieces of track equipment convoyed to Branch Avenue Station.

Video is available of the rerailing and towing of TR05.

Track conditions – no abnormal conditions were observed on track nor damage to the track as a result of the derailment.

Management on the scene: CTEM [REDACTED] – OEP [REDACTED] – Assistant Superintendent [REDACTED].

Pictures will be sent separately.

[REDACTED]

Document 6: OSA Investigation Notes

Incident Date: 5/17/2024 Time: 01:25 hours
Final Report – Derailment- Rev 1
E24385

Drafted By: SAFE 706 – 08/04/2024
Reviewed By: SAFE 702 – 08/04/2024
Approved By: SAFE 707 – 08/04/2024

Page 24

Appendix E – Work Orders



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

Page 1 of 2
MX76PROD

Work Order #: 18618728
Type: INSP



Status: INPRG
05/17/2024 05:08

Work Description: Derailment @ F09 / Post Derailment Inspection

Job Plan Description:

Incident Summary: At 0258, SAFE released the scene and the track is ready for revenue service. TR05 is currently en route to Branch Avenue Yard. No damages were reported. This is the final update.

SM-03 has arrived at Naylor Road. TR05 has been re-railed. SAFE is on the scene. Update to follow.

No damages were reported to the running rail or third rail. The unit is derailed on the catwalk side. SM-03 will be transported from Branch Ave Yard to assist with the re-railing of the unit. Update to follow.

TRST [redacted] on scene and entering the roadway to inspect the area for any damages. ATC and SAFE personnel en route. Update to follow.

Report of TR05 derailed at CM F2 369+00 on track #2. Third rail power has been de-energized. TRST, SAFE and all appropriate personnel notified and en route. Update to follow.

Additional Information
Incident Date/Time: 05-17-2024 03:10
Incident Level: B3
Location: Naylor Road
Track Number: 2

Incidents develop quickly. Please excuse any typos.

Work Information

Asset: MTR05	TR05, TRIPP MACHINE, NORDCO, S/N 760501-11	Owning Office: CTEM	Parent:
Asset Tag: MTR05		Maintenance Office: CTEM-ALEX-HVYR	Create Date: 05/17/2024 04:58
Asset S/N: 760501-11		Labor Group: CTEM-BRAN-HVY	Actual Start: 05/17/2024 05:08
Location: 2279	F99, BRANCH AVENUE YARD	Crew:	Actual Comp:
Work Location: 2279	F99, BRANCH AVENUE YARD	Lead:	Item: CTEM49200037
Failure Class: CTEM001	GENERAL	GL Account: WMATA-02-33380-50499070-041-*****-*****-OPR**	
Problem Code: 1025	ACCIDENT/COLLISION/DERAIL	Supervisor: [redacted]	Target Start:
Requested By:		Requestor Phone: [redacted]	Target Comp:
Create-Mileage: 0.0		Complete-Mileage: 0.0	Scheduled Start:

WT_plust_woprintr.rptdesign

05/31/2024 14:05

Document 7: Maximo work order for TR05 post derailment. Page 1 of 2

Incident Date: 5/17/2024 Time: 01:25 hours
Final Report – Derailment- Rev 1
E24385

Drafted By: SAFE 706 – 08/04/2024
Reviewed By: SAFE 702 – 08/04/2024
Approved By: SAFE 707 – 08/04/2024

Page 25



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

Work Order #: 18618728
Type: INSP



Status: INPRG
05/17/2024 05:08

Work Description: Derailment @ F09 / Post Derailment Inspection
Job Plan Description:

Task IDs

Task ID	Description	Component	Work Accomplishment	Reason	Status	Position	Warranty?
10	Derailment Activities (Night Shift)						
		000-400 CTEM-CAR TRACK EQUIPMENT (NON-REVENUE VEHICLES)	TOWED	INCIDENT/ACCIDENT	INPRG		N
20	Post Incident Inspections / Repairs						
		000-400 CTEM-CAR TRACK EQUIPMENT (NON-REVENUE VEHICLES)	INSPECTED	INCIDENT/ACCIDENT	INPRG		N

Actual Labor

Task ID	Laborer	Start Date	End Date	Start Time	End Time	Approved?	Regular Hours	Premium Hours	Line Cost
10	[REDACTED]	05/17/2024	05/17/2024	00:00	06:00	N	06:00	00:00	\$292.57
10	[REDACTED]	05/17/2024	05/17/2024	00:00	06:00	N	06:00	00:00	\$291.13
10	[REDACTED]	05/17/2024	05/17/2024	06:00	14:00	N	08:00	00:00	\$303.42
10	[REDACTED]	05/17/2024	05/17/2024	06:15	14:00	N	07:45	00:00	\$385.35
Total Actual Hour/Labor:							27.45	00.00	\$1,272.47

Failure Reporting

Cause	Remedy	Supervisor	Remark Date
		[REDACTED]	

Remarks:

Document 8: Maximo work order for TR05 post derailment. Page 2 of 2

Incident Date: 5/17/2024 Time: 01:25 hours
Final Report – Derailment- Rev 1
E24385

Drafted By: SAFE 706 – 08/04/2024
Reviewed By: SAFE 702 – 08/04/2024
Approved By: SAFE 707 – 08/04/2024

Appendix F – CTEM Inspection Form



CTEM Post-derailment & Accident Damage Inspection Form

(1 Form per Unit)

DATE: INSPECTOR: UNIT #:
 INCIDENT #: INCIDENT LOCATION:

GUIDELINES:

- This form is to be used for all rail vehicles involved in derailments, accidents.
- This form is to function as a guide to assist in ensuring that all vehicles are inspected to ensure that they still meet standards for operation.
- Some reference to codes and standards may be required to complete this inspection form.
- All inspection items on this form are to be marked as:

✓ = Passed X = Failed NA = Not Applicable UC = Unable to Check

NOTE: Any items that have failed are to be documented in the "Inspection Fault Report" field included on this form.

Incident Information:		<i>(NOTE: Use blank field under each question for additional information if answered Yes.)</i>	
Did the unit contact the 3rd rail? (If Yes, where was the contact on the unit?)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Did the unit contact infrastructure such as a wall or platform? (If Yes, what was contacted?)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	
Did the unit contact another unit? (If Yes, what unit and where was the contact on the unit?)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	

Truck Inspection:	
Roller bearings - no visual damage and in accordance with Rule 36	<input checked="" type="checkbox"/>
Roller bearings - no unusual noises; hand spun or run-by test	<input checked="" type="checkbox"/>
Bearing Adapters - within wear limits and in accordance with Rule 37	<input checked="" type="checkbox"/>
Drive systems - no visual damage or leaks	<input checked="" type="checkbox"/>
Side frames and bolsters - no visual damage and in accordance with Rule 47 & 48	<input checked="" type="checkbox"/>
Ride control - friction shoes & bearing adapters within limits and in accordance with Rule 46	<input checked="" type="checkbox"/>
Springs - no damage, correctly seated and in accordance with Rule 50	<input checked="" type="checkbox"/>
General - no visual damage, all components secured and in accordance with Rule 74	<input checked="" type="checkbox"/>
NOTES:	

Chassis Inspection:	
Chassis and sub-frames - no cracks, twists, other visual damage	<input checked="" type="checkbox"/>
Center plates and side bearing - no visual damage and in accordance with Rule 60, 61, and 62	<input checked="" type="checkbox"/>
Body & decking - no structural, cladding, or decking damage	<input checked="" type="checkbox"/>
Loading - load is balanced and secure	<input checked="" type="checkbox"/>
Coupler and draft arrangement - no visual damage and in accordance with Rule 16	<input checked="" type="checkbox"/>
General - no visual damage, all components secured and in accordance with Rule 74	<input checked="" type="checkbox"/>
NOTES:	

Document 9: CTEM Post-derailment & Accident Damage Inspection Form. Page 1 of 2

Incident Date: 5/17/2024 Time: 01:25 hours
 Final Report – Derailment- Rev 1
 E24385

Drafted By: SAFE 706 – 08/04/2024
 Reviewed By: SAFE 702 – 08/04/2024
 Approved By: SAFE 707 – 08/04/2024



CTEM Post-derailment & Accident Damage Inspection Form

Wheel Inspection:	
Wheels - Discoloration, cracks, spalling, and signs of movement	<input checked="" type="checkbox"/>
Gauging - Back to back measurement and in accordance with Rule 43	<input checked="" type="checkbox"/>
Gauging - Flanges & tread, and in accordance with Rule 41	<input checked="" type="checkbox"/>
General - no visual damage	<input checked="" type="checkbox"/>
NOTES:	

Brake Inspection:	
Brake rigging & cylinders - no visual damage or apparent leaks	<input checked="" type="checkbox"/>
Brake hoses & trunk lines - no visual damage or apparent leaks	<input checked="" type="checkbox"/>
Brake piping, valving and cocks - no visual damage or apparent leaks	<input checked="" type="checkbox"/>
Brake operation - passes functional test	<input checked="" type="checkbox"/>
Friction shoes - greater than 3/8" and accordance with Rule 12	<input checked="" type="checkbox"/>
Rolling brake test - unit stop as designed without locking up wheels	<input checked="" type="checkbox"/>
Hand brake - no visual damage and applies as designed	<input checked="" type="checkbox"/>
General - no visual damage, all components secured and in accordance with Rule 74	<input checked="" type="checkbox"/>
NOTES:	

Miscellaneous Equipment Inspection:	
Horn - operational	<input checked="" type="checkbox"/>
Lighting - operates as designed	<input checked="" type="checkbox"/>
Radio - perform radio check, operates as designed	<input checked="" type="checkbox"/>
Propulsion and braking controls - all controls operate as designed	<input checked="" type="checkbox"/>
Cameras - clear picture, operates as designed	<input checked="" type="checkbox"/>
Emergency equipment - Interlocks emergency valves, E-stops, etc., operate as designed	<input checked="" type="checkbox"/>
Locks & restraints - mechanical locks and restraints are in place and operate as designed	<input checked="" type="checkbox"/>
NOTES:	

Inspection Fault Report:

Can unit be returned to service? Yes No

Inspector's Signature:

Document 10: CTEM Post-derailment & Accident Damage Inspection Form. Page 2 of 2



Washington Metropolitan Area Transit Authority

CENV

Incident Report

TR05 Derailment at Naylor Road Station

May 17, 2024

Document 11: CENV Incident Report. Page 1 of 6

Incident Date: 5/17/2024 Time: 01:25 hours
Final Report – Derailment- Rev 1
E24385

Drafted By: SAFE 706 – 08/04/2024
Reviewed By: SAFE 702 – 08/04/2024
Approved By: SAFE 707 – 08/04/2024

Page 29



Washington Area Metropolitan Transit Authority
Incident Summary Report

Table of Contents

Investigation Team Members 2
Executive Summary 3
Introduction 3
Findings of Investigation 4
Conclusion 5
Recommendations 6

LOCATION: CM - F2 - 369+00
INCIDENT #: WO 8758662
DATE: 05/17/2024
TIME: 1:26:00 AM

Investigation Team Members

██████████ Vehicle Engineer – Vehicle Program Services, Rail Fleet

Report Prepared By: ██████████

Report Approved By: ██████████

██████████ Digitally signed by ██████████
Date: 2024.07.19 10:53:00
-04'00'

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Document 12: CENV Incident Report. Page 2 of 6

Incident Date: 5/17/2024 Time: 01:25 hours
Final Report – Derailment- Rev 1
E24385

Drafted By: SAFE 706 – 08/04/2024
Reviewed By: SAFE 702 – 08/04/2024
Approved By: SAFE 707 – 08/04/2024

Executive Summary

On the morning of 05/17/2024, at approximately 0126, TRIPP Machine TR05 derailed, inbound, near Naylor Road (F09) at chain marker F2-369+00 (Figure 1). This incident occurred while TR05 was transporting from Alexandria yard for upcoming work.

Following a transition from Travel mode into Work mode, the vehicle traveled approximately 125 feet before the derailment occurred. At the time of the incident, the vehicle was moving forward at approximately 7 mph with forward propel engaged.

Car Track Equipment Maintenance (CTEM) was notified and promptly dispatched mechanics to initiate the re-rail process. SAFE cleared the site for re-railing and CTEM personnel successfully railed, inspected, and towed the vehicle to Branch Avenue yard for further damage inspection and repair. TR05 cleared the mainline and arrived at Branch Ave yard at approximately 0310. No injuries to personnel and no damage to vehicle or infrastructure was reported.



Figure 1 - TR05 Derailment

Introduction

WMATA utilizes the TRIPP machine to perform system maintenance on the WMATA rail system. TR05 is one of the four TRIPP machines out of five vehicle that use this chassis design. The TRIPP machines are long-wheelbase, single-axle (non-trucked) platforms.

The TRIPP machine's long-wheelbase, single-axle design results in a high wheel Angle of Attack in curves. Under normal operation, in Travel mode, TRIPP machines are equipped with an air suspension system that is inflated to allow suspension compliance to accommodate for this as well as provide even weight distribution. However, when in Work mode, the suspension is deflated for rigidity, essentially removing its suspension. For this reason, the TRIPP machine's speed is limited to 5 MPH in Work mode. In Travel mode, speed is limited to 15 MPH per WMATA policy.

Page 3 of 6

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Page 31

TRIPP Machines are known to have a higher chance of derailing when operating in Work mode. Derailments have historically occurred while traveling with a malfunctioning air suspension and overspeeding in Work mode. Efforts were made during acceptance to increase the weight of the front end, including the installation of a second fuel tank and welding steel plates on the frame, directly above the front axle. In 2017, the TRIPP machines were modified with a warning system that notifies the operator, when speeds exceed 5 mph in Work mode and when the air suspension is under-inflated in Travel mode.

Findings of Investigation

Once TR05 reached Branch Avenue yard. CTEM conducted a post-incident inspection of the vehicle and found no issues. Vehicle Program Services Engineering (CENV) gathered data from TR05's data logger and digital video recorder to analyze. According to the recorded data, the vehicle was traveling at approximately 7 mph at the time of the incident. Refer to Figure 2 to review the recorded data.



Figure 2 - TR05 Derailment Incident Data Graph

NOTICE: The Data Recorder's time lags 1 hour and 20 minutes behind the local time. The Digital Video Recorder time lags 58 minutes behind the local time.

Correcting for time offset, the following is a chronological chain of events around the time of the incident:

1. 01:02:40 Vehicle applied the brakes and switched to work mode.
2. 01:02:47 Vehicle resumed moving.
3. 01:03:08 Vehicle reached 8 mph and the service brakes applied.
4. 01:03:11 Vehicle came to a stop.

Considering the operator's complaint that the vehicle did not have sufficient torque to navigate the track area while in travel mode, CENV inspected the drive system pressures. All pressures were found set to the OEM recommendations. The vehicle suspension's tram and diagonal were found within OEM and AREMA limits. The vehicle drawbar force was tested and measured 2580 lbs. Since drawbar force is not a documented measurement it was compared to TR04's drawbar force at 2560 and deemed not to be appreciably different.

The vehicle was leveled and weighed to determine the difference between Work mode vs Travel mode balance. In Travel mode the vehicle balanced, however in Work mode, any variances in cross level over the wheelbase would cause drastic lateral imbalances. As little as 1/4 inch of cross-level shifts the imbalance by 42%. The cross level at the point of derailment was not recorded. However, according to WMATA standards, the maximum allowable cross level ramp in a spiral, over the wheelbase of the vehicle would be .8 inches. In this situation the front imbalance in work mode is approximately 76%.

Travel (3/4" low @ RF)			
LF	7200	8920	RF
LR	13720	10560	RR
Work (3/4" low @ RF)			
LF	3100	12960	RF
LR	17640	6860	RR

Conclusion

TR05 was unable to negotiate the inclined radius while in Travel mode. This is likely due to vehicle dynamics while operating within track area requiring more tractive effort than could be supplied. In other words, the hill load, plus the frictional load from curving and wheel scrub is greater than the vehicle's propulsion can provide. Once the vehicle was switched to Work mode the frame rigidity causes uneven wheel loading. This reduces the frictional forces (wheel scrub) allowing the vehicle to continue to move. At the same time, the unloaded wheel is susceptible to flange climb. If the conditions where the derailment occurred are considered, specifically the vehicle climbing a grade while on a right-hand spiral transition to tangent track, that condition would allow for an unloading of the left front wheel (the curves outside front wheel). When compared to the actual derailment, this is precisely the circumstances that were found.

It therefore can be concluded the derailment resulted from wheel climb initiated by traveling at sufficient speed in Work mode while in a spiral transition curve.

Recommendations

CENV will develop ECC 2406022 to supply more torque to the wheels to remove the need to enter Work mode outside of the work area.

Until this can be accomplished, TRST should ensure Tripp machines are not used in work mode while traveling the mainline and should limit the amount of total mainline travel by trucking vehicles to the yard nearest the work area.

Page 6 of 6

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Document 16: CENV Incident Report. Page 6 of 6

Appendix H - Service Bulletin

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Page 34

ALWAYS CHECK SOURCE DOCUMENT FOR CURRENT REVISION

WMATA - VEHICLE PROGRAM SERVICES

SERVICE BULLETIN

ATTENTION RAIL EMPLOYEES

TITLE: CTEM - SPEED LIMITATIONS OF NON-TRUCKED, CLASS 2 RAIL VEHICLES

SB X-005 Rev 00 INITIATING DOCUMENT(S): N/A

ASSOCIATED SBs: N/A

SB to be tracked as a campaign PI Manuals are affected
 Information (APPLICABLE FOR QUICKFLOW ONLY)

CENV/RAIL VEHICLE ENGINEER [REDACTED] DATE: Jan 15, 2019

PROGRAM/CENV MANAGER APPROVAL [REDACTED] DATE: Jan 15, 2019

CHIEF ENGINEER APPROVAL [REDACTED] DATE: Jan 22, 2019

ALWAYS CHECK SOURCE DOCUMENT FOR CURRENT REVISION

WMATA - VEHICLE PROGRAM SERVICES

SERVICE BULLETIN

ATTENTION RAIL EMPLOYEES

SPEED LIMITATIONS OF NON-TRUCKED, CLASS 2 RAIL VEHICLES	SBX 005
CTEM SERIES RAILCARS	Rev 00

This Service Bulletin is distributed as information pertaining to the speed limitation on Class 2 vehicles without trucks.

Wheel flange derailments generally occur in situations where the wheel experiences a high lateral force in conjunction with a lower vertical force, this ratio of forces is commonly referred to as the L/V ratio. High lateral force can be induced by speed, suspension characteristics and high wheelset angle of attack (the angle of the wheelset compared to the tangent of the rail). Vertical force on a wheel can be reduced when negotiating poor track or when the suspension has poor load equalization.

Vehicles without trucks or sufficient suspension will not equalize their wheel loads and, in most cases, have limited ability to steer their axles to reduce angle of attack. Higher speed causes the wheel with the higher angle of attack to become the flanging wheel. This, in conjunction with the potential for lower vertical forces due to the vehicles inability to equalize their wheel loads can lead to a lateral to vertical wheel load (L/V) ratio that may result in derailment.

In these instances, the unit's speed is a controllable factor and limiting a vehicle speed will significantly decrease the likelihood of derailment by keeping the lateral force low.

Due to the extremely variable and dynamic nature of rail to wheel interfaces, a maximum speed the vehicle can travel on the WMATA roadway cannot be determined without performing analysis on each individual vehicle. However, the highest speed restriction applied to vehicles for unfavorable track conditions (condition Red restriction) limits vehicles to 15 mph; this restriction can be inversely applied to a vehicle with poor suspension on track in good (green) condition and will considerably decrease the likelihood of aforementioned type of derailment.

All non-trucked Class 2 Vehicles will be limited to 15 mph. All subject vehicles must be labeled to inform the operator

Document 17: Service Bulletin X-005, Speed Limitations of Non-Trucked, Class 2 Rail Vehicles.

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Appendix I – Photograph



Photograph 1: Shows the left side of TR05.

Appendix J – Why-Tree Analysis

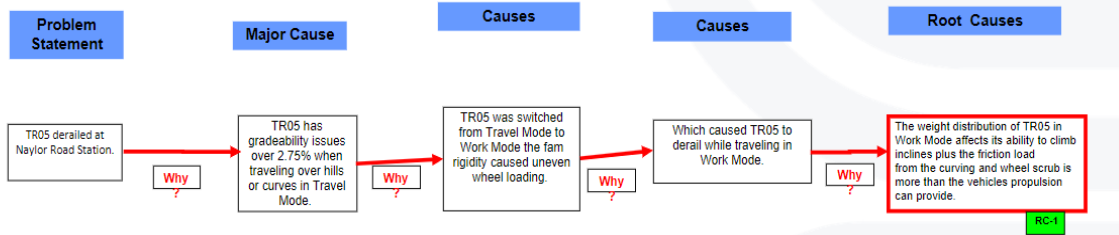


Chart 2: Root Cause Analysis.