



WMSC Commissioner Brief: W-0079 – Pull-Apart – outside Union Station – October 9, 2020

Prepared for Washington Metrorail Safety Commission meeting on May 18, 2021

Note: Parts of this investigation were conducted in conjunction with parts of investigation W-0080 into a November 24, 2020 pull-apart outside Glenmont Station. Multiple corrective actions and root causes for these events overlap. During this investigation, the WMSC also began a previously planned audit of Metrorail's revenue vehicle (railcar) program. The final audit report is expected to be issued this summer.

Safety event summary:

A 6000-series Red Line train that had just departed Union Station toward NoMa-Gallaudet Station in P5 power mode pulled apart into two separate sections on October 9, 2020 at 12:18 p.m. The two sections ended up approximately 59 feet apart. After the train operator reported that the train's brakes had activated automatically, a train passing on the opposite track notified the ROCC that Train 108 had separated between cars 6075 and 6079.

RTRA personnel stated after the event that a customer in the leading two cars used the train intercom to inform the operator of the separation. More than 2.5 minutes after the separation, the train operator reported that the car console was reading two cars rather than eight cars. WMATA's troubleshooting guide does not specify to check the number of cars in the consist.

The ROCC instructed the train operator to perform a ground walk-around and to make announcements to customers. Making announcements was not possible to customers on the trailing section of the train because Metrorail's carborne communications systems rely on the electronic connections that are part of the coupling process. In this event, the coupler disconnected from Car 6075 and remained mechanically coupled to Car 6079.

The ROCC called the D.C. Office of Unified Communications (911 dispatch) at 12:22 p.m. The investigation and the related emergency response debrief the WMSC required WMATA to conduct identified that WMATA did not convey to D.C. Fire and EMS what response was needed, in part because WMATA had not worked with the region to establish any standard response package or protocols for such an event and in part because of a lack of shared common language among Metrorail personnel and other first responders. This lack of preparation also created confusion regarding what WMATA was asking the fire department for help with (i.e., evacuation, patient evaluation). Communication at the scene and the direct interaction of decision makers was also lacking, and WMATA personnel did not fully communicate across different departments.

The ROCC de-energized third rail power on Track 1 at 12:30 p.m., and a supervisor confirmed at 12:45 p.m. that third rail power was de-energized.

The Train Operator used a fire extinguisher to address a smoldering crosstie. The investigation determined the damaged coupler centering spring from the train likely triggered the smoldering tie.

DCFEMS arrived at the Hopscotch Bridge at 12:37 p.m. and set up there above the incident to gain effective situational awareness due to the clear view of the event from that bridge that carries H Street NE over the Amtrak and WMATA right of way behind Union Station. The investigation found that not all Metrorail personnel required reported to the



incident command post, and an RTRA supervisor did not report there despite several requests. Metrorail did not effectively identify and communicate to that supervisor or other responding personnel where the incident command post was actually located, which led to communication and decision-making challenges. Metrorail repeated the term Hopscotch Bridge, but not all personnel are familiar with the areas at and around Metrorail stations, and therefore require more specific information such as an intersection, street address or other landmarks.

Metrorail initially attempted to single-track, and later suspended service in the area after the ROCC was unable to establish lunar signals due to a down track circuit.

DCFEMS and Amtrak's emergency response team were positioned at an access gate between Amtrak property and WMATA property by 12:54 p.m. Their request to the ROCC to access the roadway was relayed directly on OPS 1 at 1:06 p.m. WMATA cycled through a number of plans related to moving the railcars or other evacuations, but evacuations did not occur until approximately 1:45 p.m., approximately 90 minutes after the train separation. There also appear to have been miscommunications or incomplete contingency planning that led to Metrorail not moving the 6-car portion of the train back to Union Station earlier under its own power.

In the interim, customers had opened the side emergency doors of the train to provide for ventilation and airflow due both to temperature comfort and the public health emergency. It is not clear that this was clearly communicated to all of the various WMATA personnel providing various instructions and plans. At least one customer stepped off the train at one point and was escorted back onto the 6-car consist. During the extended delay in evacuation, customers were also reported to be fighting due to panic. Metro Transit Police did not respond to the train location, but were present in liaison and related positions on the periphery of the event.

The bulkhead (end) doors of the cars that pulled apart were not locked after the pull apart as required by SOP 13, and the CMNT Road Mechanic was not familiar with SOP 13. Metrorail had no procedure governing how to determine whether a train can be moved following a pull apart.

WMATA procedures require customer evacuations be conducted through bulkhead doors at the end of a train using ladders, however in this event evacuations were conducted through the side emergency doors. Warning Strobe and Alarm Devices (WSADs) were set up at each end of the train and between the train sections. Metrorail did not follow power procedures that require breakers to be racked out by power personnel.

RTRA and MTPD provided different numbers of customers on the train in this event – 103 and 108.

After evacuations were completed and DCFEMS departed the scene, a recovery train was sent to move the lead two cars to Brentwood Yard. The trailing 6 cars were moved to the yard under their own power.

Around 5 p.m., the coupler areas involved in the pull apart underwent an initial evaluation in the Brentwood Rail Yard that identified that the failure was similar to the August 25, 2018 pull apart that was linked to incorrect parts and power tool usage on a coupler that connected the two cars in a married pair. While at the Brentwood Rail Yard, photos were taken to document the condition of the coupler. Proper tools to conduct torque value checks were not immediately available, so it was determined that a more complete examination would be conducted the following morning at the Greenbelt Major Repair and Overhaul Shop.



When WMSC and WMATA investigators arrived at Greenbelt the following morning, the clamping bolt had been tampered with. The torque stripe, which had been intact the prior evening, was now broken. Further investigation later identified that management had not clearly communicated expectations and requirements to technicians, which led to a technician attempting to take torque readings outside of the investigations process. The WMSC issued a finding on October 20, 2020 requiring a corrective action plan to address the integrity of investigations.

Further investigation and review of the coupler assembly determined that improperly or insufficiently torqued bolts and fasteners were in place on this coupler, that there were signs of dirt, debris, brake dust and rust on the buffer tube and gland nut threads suggesting movement and exposure over a prolonged period, and that Metrorail had an incomplete overhaul and inspection process. For example, original equipment manufacturer documentation requires that the fasteners be lubricated before installation, however Metrorail was dry torquing the buffer stem screw.

In addition to the pull-apart that occurred on November 24, 2020, this event is also similar to a 2018 pull-apart near McLean Station, W-0011. That event, and much of the investigation into that event, occurred prior to the WMSC's certification. The investigation identified that Metrorail used improper parts and did not have appropriate coupler procedures in place. Metrorail failed to institute a comprehensive corrective action plan.

After this October 2020 event, Metrorail informed the WMSC that it would inspect all 6000 Series couplers. However, Metrorail only checked whether gland nuts were flush and properly torqued and whether the correct buffer stem screw was in place. Metrorail did not check all bolts or fasteners on the couplers. Still, WMATA identified 12 cars with discrepancies: 9 with incorrect hardware, and four cars with one gland nut thread showing.

A review of the work orders on the car involved in this pull apart also showed that there was no documentation showing that calibrated tools were used for the coupler rebuild and installation process.

An overall review of Metrorail's 6000 Series coupler overhaul program, which Metrorail had incorporated into a broader rehabilitation program referred to as the SMP program, identified that the rehabilitation program and related processes had not followed safety certification processes.

Probable Cause:

The probable cause of this pull apart was a lack of and incomplete inspection, maintenance and overhaul procedures, a failure to follow documented review and approval processes, and a failure to fully learn from prior events to implement systemic changes and reviews.

Contributing to the severity of the consequences of this event was Metrorail's inadequate communication and emergency preparedness, lack of complete coordination with incident command, and Metrorail's failure to prioritize customer safety, which led to the significant delay in a controlled evacuation.

Corrective Actions (as noted above, some also relate to W-0080):

Metrorail has halted 6000-series coupler overhauls and removed 6000-series cars from service (following November 24, 2020 event). 6000-series trains are being moved only overnight at restricted speed and after a special inspection.



Metrorail is reviewing the coupler and drawbar overhaul processes with the manufacturer, is procuring the tools required to conduct this work, and is determining the way it plans to examine and properly rebuild the couplers under a revised procedure that includes torque striping for all fasteners and ensuring that proper parts are used. Metrorail is also correcting all torque values and applications in this procedure, and will require the use of adhesive on fasteners.

Metrorail is reviewing the 2000 and 3000 series coupler and drawbar rebuild procedures in relation to manufacturer processes, tools and torque striping requirements for all fasteners.

Metrorail is revising the 6000-series inspection procedure to require a visual inspection of couplers and fasteners, and to require physical vertical movement of the coupler horn to identify any play in the gland nut.

Vehicle Engineering (CENV) plans to develop and institute a quality assurance process to ensure correct fasteners are used during the overhaul process.

CENV plans to develop and institute a quality assurance process to ensure correct torque and torque striping are applied during overhauls.

CENV has reorganized to specify a legacy vehicles engineering and new car procurement group, and has recently created a quality compliance group.

Metrorail plans to examine changes to response to ensure that needed staff respond and that train recovery staff and cleanup staff are staged in the appropriate locations, including intermediate staging areas.

Metrorail plans to ensure that there is one command post representative from each operational group, with additional representatives from SAFE, OEM and MTPD.

Metrorail plans to schedule internal emergency incident workshops for operational groups.

Metrorail plans to develop or enhance emergency response plans with Amtrak, CSX and VRE and to incorporate them into training and full-scale exercises when possible.

Metrorail plans to take steps to more clearly identify the incident command post location and responsible parties using features such as a visual landmark, signage, armbands or helmet identifiers.

Metrorail plans to establish a dedicated common radio channel for emergency incidents.

Metrorail plans to review emergency incident training to incorporate more train operators, RTRA Supervisors and similar staff.

Metrorail plans to emphasize the use of common language, particularly for personnel who are not typically involved in emergency management or response.

Metrorail plans to develop or reinforce a platform for operational stakeholders to access the incident command post.

Metrorail will review whether customer de-escalation training should be developed for train operators, road mechanics, supervisors and emergency response personnel.



The ROCC has re-committed to establishing an emergency management team for events that directly affect the controller's ability to oversee normal operations.

The ROCC will add a pull-apart scenario with smoke conditions to the skill drill scenarios developed following the WMSC's ROCC findings.

The ROCC is adding a cordless phone to assist with Fire Liaison communication improvements required under the WMSC's ROCC findings.

The ROCC plans to change managerial scheduling to ensure the equivalent of an assistant superintendent and superintendent are scheduled on each shift, in conjunction with the broad improvements required by the WMSC.

RTRA developed a lessons learned related to processes and procedures during a pull-apart and smoke event, including communication responsibilities on both ends of the separated consist.

SAFE is continuing its rules review, to include opportunities to improve ADA coverage in the event of an emergency.

As required by the WMSC's Oct. 20, 2020 finding, SAFE is reviewing and updating SOP 800-01 related to investigations, including improvements in the chain of custody process to maintain the integrity of the investigation.

WMSC staff observations:

The WMSC responded to the scene.

Once customers opened the doors – which wasn't immediately known to the ROCC and response planners – Metrorail could have considered moving to the evacuation more quickly given available personnel and the additional safety steps that are required to ensure the safety of any customer who may be on the roadway following a self-evacuation. The challenges in available personnel included a lack of Metro Transit Police Department (MTPD) response to the train itself, with MTPD remaining on the periphery of the event rather than responding to the train to ensure customer safety and proper evacuation once the duration of the emergency became clear.

Communications with customers is critical at any time, but particularly in an emergency. During a pull-apart or other train separation, these communications are not possible to the trailing portion of the consist through the train's public address system. In other safety events, train malfunctions can limit communications for other reasons. Metrorail may want to consider alternatives to ensure that critical safety messages can be conveyed in a timely fashion.

This event also highlights the importance of Warning Strobe and Alarm Devices (WSADs), since Metrorail did not follow proper power safety protocols of racking out breakers to ensure that power was not inadvertently restored while customers or first responders remained on the roadway. Consistent, quality, recurring training on this and other procedures is critical, be it the power procedures, SOP 13, SOP 1A or others.

The WMSC will continue reviewing 6000 Series coupler overhaul and other documentation in conjunction with regular inspection, audit and safety certification oversight activities beyond the conclusion of this investigation. Metrorail may consider whether the couplers are facing more stress than was factored in during design phases due to Metrorail's long-term use of manual train operations.

Staff recommendation: Adopt final report.



Washington Metro Area Transit Authority

Department of Safety and Environmental

Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E20385

Date of Event:	10/9/2020
Type of Event:	Unintentional Uncoupling/Pull-Apart
Incident Time:	12:18 hrs.
Location:	Between Union Station and Noma-Gallaudet Station at Chain Marker (CM) B1-084+00
Time and How received by SAFE:	12:19 hrs. SAFE On-call Phone
WMSC Notification Time:	14:00 hrs.
Rail Vehicle:	L6074- 6075.6079 -6078.6113-6012.6067-6066T
Injuries:	There was one NTD reportable customer injury due to medical transport, which was the result of an existing heart condition. There were five other reported customer injuries that did not require medical assistance (i.e., not NTD Reportable). These injuries included knee pain, lower back pain, minor cut on the left hand, and an unspecified injury.
Damage:	Front Coupler - Car #6075
SMS I/A Number:	20201009#89444

Union Station and NoMa-Gallaudet Station
Unintentional Uncoupling/Pull-Apart
October 9, 2020

TABLE OF CONTENTS

Abbreviations and Acronyms	3
Executive Summary	4
Similar Event	6
Incident Location	7
Purpose and Scope	7
Investigation Process and Methods	7
Investigation	9
Chronological Timeline of Events	14
Office of Vehicles Program Services (CENV) Review	16
Office of Car Maintenance Review	25
Metro Transit Police Department Review	27
Incident Emergency Response Debrief (49 CFR 239) Review	28
Interview Findings	29
Immediate Mitigations to Prevent Recurrence	31
Investigation Findings	31
Weather	32
Human Factors	32
Probable Cause	32
Recommendations/Corrective Actions	33
Appendix A – CMNT Memorandum	35
Appendix B – Interview Summaries	37

ABBREVIATIONS AND ACRONYMS

AIMS	Advanced Information Management System
ARS	Audio Recording System
CCTV	Closed Circuit Television
CENV	Vehicle Program Services
CMNT	Office of Car Maintenance inspection
CMO	Chief Mechanical Officer
CMOR	Office of Chief Mechanical Officer
CTEM	Car and Track Equipment Maintenance
DCFEMS	District of Columbia Fire Emergency Medical Services
FT	Foul Time
IC	Incident Commander
ICP	Incident Command Post
MSRPH	Metrorail Safety Rules and Procedures Handbook
MRO	Major Repairs and Overhaul Shop
MTPD	Metro Transit Police Department
NOAA	National Oceanic and Atmospheric Administration
OEM	Original Equipment Manufacturer
OJT	On-the-Job Training
OSC	On-Scene Commander
ROCC	Rail Operations Control Center
ROQT	Rail Operation Quality Training
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
RWIC	Roadway Worker in Charge
RWP	Roadway Worker Protection
SAFE	Department of Safety & Environmental Management
TRST	Office of Track and Structures
VMS	Vehicle Monitoring System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

FINAL REPORT OF INVESTIGATION A&I E20385

EXECUTIVE SUMMARY

On Friday, October 9, 2020, at 12:18 hrs., the Train Operator of Train ID 108, a Red Line 8-car 6000 Series consist [L 6074-6075.6079-6078.6113-6012.6067-6066 T] operating towards Glenmont Station, Track 1 experienced a Brakes in Emergency (BIE) condition between Union Station and NoMa-Gallaudet Station. The Train ID 108 Train Operator subsequently notified the Rail Operations Control Center (ROCC) Radio Rail Traffic Controller (RTC) of the train's condition. Train ID 805 Train Operator operating on the adjacent track notified the ROCC that Train ID 108 had uncoupled between cars 6075 and 6079.

At 12:21 hrs. the Radio RTC instructed Train ID 108 Train Operator to make proper announcements to their customers and exit the train to perform a ground walk-around inspection. At 12:22 hrs., the ROCC Assistant Superintendent notified the District of Columbia Fire Emergency Medical Services (DCFEMS) of the unintentional uncoupling. At 12:26 hrs., the ROCC initiated a single-track operation between Judiciary Square and Union Stations by way of Track 2. At 12:29 hrs., Train ID 108 Train Operator notified the Radio RTC of a smoldering tie at Chain Marker (CM) B1-084+00 in the proximity of the uncoupled cars.

At 12:30 hrs., the ROCC de-energized third rail power between Union Station and NoMa-Gallaudet Station, Track 1. At 12:32 hrs., Train ID 108 Train Operator reported they completed the ground walk-around and confirmed the uncoupling at CM B1-084+00. The Radio RTC assigned the Office of Rail Transportation (RTRA) Supervisor located at Union Station as On-scene Commander (OSC) and gave them permission to enter the roadway utilizing Foul Time (FT) Protection in the direction of the down train at 12:33 hrs. The OSC reported smoke emitting from the track, and Train ID 108 Train Operator said they utilized a fire extinguisher to extinguish a smoldering tie [appearing to be smoke].

At 12:37 hrs., the DCFEMS arrived on location and assumed command at the Hopscotch Bridge. At 12:46 hrs., the Buttons RTC de-energized third rail power on Track 2. At 12:54 hrs., DCFEMS Engine 12 and Amtrak Recon (Amtrak's emergency response team) reported being positioned at the access gate to assist customers as they exited the affected consist. Amtrak Recon gave the authorization to access the incident scene from Amtrak's Supply Entrance at the 700 block of First Street, NE. At 13:08 hrs., RTRA personnel conducted a walkthrough of both halves of consists and reported a total count of 103 customers onboard. The count consisted of 86 on the 6-cars and 17 on the married pair [6074-6075]. Note: There was a count deficiency of 108 reported by MTPD vs. 103 reported by RTRA. The 103 figure is the officially tally being used.

The RTRA Forward Liaison notified ROCC that one customer exited from the 6-car consist and was escorted back on the train. At 13:34 hrs., the Radio RTC instructed the Office of Car Maintenance (CMNT) Road Mechanic to make move preparations for the 6-car consist towards Union Station. The Radio RTC also attempted to ascertain from CMNT Road Mechanic if the married pair [6074-6075] could be moved to Union Station. CMNT Road Mechanic reported that the car [6074-6075] was inoperable, would not move, and needed to be recovered.

The Radio RTC attempted to confirm through the CMNT Road Mechanic if the 6-car consist could be moved within 2 feet of the married pair [6074-6075], which would allow customers to board the 6-car consist. CMNT Road Mechanic reported that the closest the train could move would be within 4 feet due to the coupler assembly's condition. The ROCC communicated a plan to have

customers board the 6-car train from the 2-car train and using the former to transport customers to Union Station; ROCC requests OSC to confirm the plan. At 13:39 hrs., the OSC informed the ROCC of the new customer evacuation plan per WMATA Incident Commander (IC) to evacuate customers through the Union Station side's access gate. OSC requested the ROCC provide a confirmation update when third rail power was brought down from Union Station to NoMa-Gallaudet Station. The Radio RTC notified the RTRA Forward Liaison that ROCC would not attempt to move the train; DCFEMS and MTPD would enter the roadway to perform customer evacuation.

Train ID 108 Train Operator reported customers began to exit the train. The RTRA Forward Liaison reported to the Radio RTC that two customers had exited the train, were on the roadway and under the DCFEMS control. At 14:08 hrs., the RTRA Forward Liaison reported to the Radio RTC that DCFEMS safely escorted all the customers from the 6-car consist to the Amtrak platform at CM B1-087+00. Two elderly customers requested assistance during the evacuation; DCFEMS requested a Gator vehicle to transport these customers for on-scene medical treatment.

At 14:24 hrs., RTRA Forward Liaison reported to the Radio RTC that all personnel and equipment were cleared of the roadway, and DCFEMS turned the incident over to WMATA. The RTRA Forward Liaison reported to the Radio RTC that third rail power could be restored. The Button RTC restored third rail power on Tracks 1 and 2 between Brentwood Yard and Union Station. The Brentwood Interlocking Operator dispatched a recovery train from Brentwood Yard to transport the married pair [6074-6075] back to Brentwood Yard for post-incident inspection. The 6-car consist was able to move without further assistance back to Brentwood Yard.

On October 9, 2020, at approximately 17:00 hrs., SAFE, CMNT and CENV arrived at the Brentwood Yard to conduct an on-site inspection of Car 6075 and Car 6079 front couplers. Once the railcars were in the shop, all the stakeholders present proceeded to inspect the railcars for anomalies; at this time, the group identified the failure to be similar to the 2018 McLean Station pull-apart event. There were several photos of the condition of both sides of the coupler, including the bolt and nut installed on the buffer tube to apply clamping force to the gland nut. The bolt and nut were intact with no evidence of mechanical forces being applied, with the torque stripe on the nut side still intact.

Deputy Chief Engineer (DC CENV) was in communication with the Chief Mechanical Officer (CMO) and was being instructed to check the torque values of the clamping hardware at the Brentwood shop. DC CENV requested assistance from the Brentwood MRO Supervisor to check the torque as instructed by CMO. CMNT Technicians were instructed to locate the necessary tools to perform the torque value verification and were not able to acquire a torque wrench that could measure up to 226 ft-lbs. Based on lessons learned from the McLean Station incident, and discussion with CMNT, CENV and SAFE personnel, it was agreed that the teardown and inspection of the coupler and associated component be performed at the Greenbelt Major Repair and Overhaul (MRO) Shop under a controlled environment and with the appropriate tools. When the CMNT Technicians returned with the necessary tools, they were instructed by DC CENV to hold off and wait for further instructions. No torque test was conducted at that time.

The group returned to the Brentwood Inspection Office where the details of the next step were discussed by CENV, CMNT, and SAFE personnel. The agreement was to remove the coupler from the railcar and transport it to Greenbelt MRO Shop. CMNT would take the necessary actions to provide two technicians for the teardown, and the group would reconvene at the Greenbelt MRO Shop at 8:00 hrs. on Saturday, October 10, 2020. The Brentwood MRO Supervisor received verbal instructions and was asked if they understood the next steps in the process; to which they replied, yes. The instructions were repeated to only remove the coupler from the railcar to not

disturb the clamping bolt, shrink wrap it and transport it to the Greenbelt MRO Shop. They acknowledged the instructions and departed the Brentwood Inspection Office.

On Saturday, October 10, 2020, at approximately 07:30 hrs., at the Greenbelt MRO Shop, Washington Metrorail Safety Commission (WMSC), SAFE, CENV, and CMNT personnel noticed that the clamping bolt had been tampered with due to the broken torque stripe and signs of mechanical forces having been applied to the bolt and nut. A discussion between the groups took place to find out if anyone had instructed maintenance personnel to take torque measurements prior to the arrival at 08:00 hrs. All present declined knowledge of any manipulation of the clamping bolt.

At approximately 08:17 hrs., the Brentwood MRO Supervisor was contacted via phone and was asked if their group had taken any measurements on the clamping bolt and replied no; however, they called their senior technician to verify. Shortly after, the Brentwood MRO Supervisor emailed back and stated that their technician had taken the torque reading as originally instructed.

The probable cause of the chain of custody breakdown was a lack of communication with the CMNT Technicians assigned to remove the coupler. The initial instructions were to check the torque values on-site at Brentwood Yard; however, a change of directions was agreed upon in the absence of the CMNT Technicians and that information was never conveyed to them. They proceeded to check the torque value and remove the coupler to ship it to Greenbelt MRO.

The probable cause of the pull-apart event between Union and NoMa-Gallaudet Stations on October 9, 2020, involving Train ID 108 Car 6075 and Car 6079, was procedural deficiencies and the absence of Quality Management System. These led to the prior improper overhaul and repair during the failed mechanical coupler rebuild process. An inspection of the fasteners indicated the buffer stem screw was not lubricated as required per OEM procedures and was dry torqued.

As a result, the flange collar did not achieve adequate clamping force due to insufficient torque on the buffer tube screw, which allowed the gland nut to slowly back out over time. This caused the draft bar (and spring pack) to separate from the buffer tube, causing a pull-apart event.

There is no instruction within the WMATA procedure to inspect the front-end mechanical coupler gland nut threads to identify potential movement; this was determined from the WMATA 6000 Series under-car inspection PI investigation review.

SIMILAR EVENT

E18368 – McLean Station – Train Pull-Apart

Based on a historical events review, a previous event was identified that occurred on August 25, 2018, outside of McLean Station with similar characteristics. The probable cause of this incident was incorrect hardware and power tool usage. These factors led to the buffer bolt's cross-threading that subsequently caused a false torque reading resulting in reduced clamping force on the buffer tube. In turn, this allowed the gland nut to slowly back out over time, leading to the draft arm and spring pack pulling out of the buffer tube, causing married pair Car 6038 and Car 6039 to pull-apart at the Semi-Permanent Drawbar.

INCIDENT LOCATION

The following provides detail of the incident location:

- Between Union Station and Noma-Gallaudet Station, Track 1
- CM B1-084+00, Ballast Track
- Gap Between Separated Trains - 59 feet

Field Sketch



Figure 1: Top-down view of incident area.

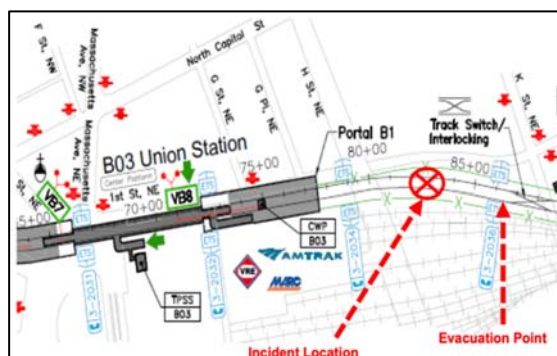


Figure 2: Track diagram of incident area.

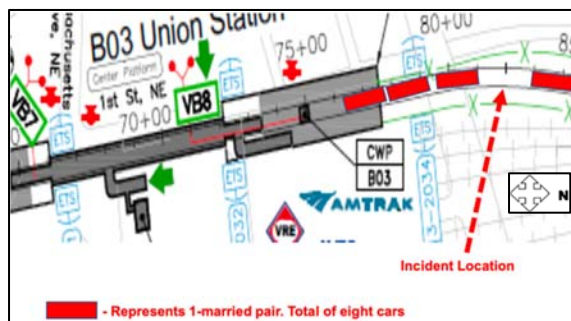


Figure 1: Close up of incident area, focus on consist locations.

PURPOSE AND SCOPE

The purpose of this incident investigation 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.

INVESTIGATION PROCESS AND METHODS

Upon receiving the ROCC Pull-Apart Event notification between Union Station and NoMa-Gallaudet Station on October 9, 2020, 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:

- Physical Site Assessment
- Formal Interviews – SAFE interviewed 15 individuals as part of this investigation. Interviews included persons present during and after the incident, those directly involved in the response process, and managers responsible for process implementation. SAFE interviewed the following individuals:
 - Train Operator
 - One Button RTC
 - One Fire Liaison
 - One ROCC Assistant Superintendent
 - Three CMNT Maintenance Rebuild and Overhaul Technicians
 - Three CMNT Technicians
 - One CMNT Major Repairs and Overhaul (MRO) Supervisor
 - One CMNT Road Mechanic
 - One CMNT Assistant Superintendent
 - One CMNT Assistant General Superintendent
 - One CENV Deputy Chief
- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information.
- Documentation Review – A collection of relevant work history information and process documentation in Metro systems of record. These records included:
 - Employee Training Procedures & Records review
 - Certifications
 - The 30-Day work history review
 - MSRPH review
 - National Oceanic Atmospheric Administration (NOAA) data review
 - 6000 Series PI procedure review
 - 6000 Series Heavy Repair Maintenance Manual [Rev 1.0 February 1, 2008]
 - MSI 150088 6000 Series Front-End Mechanical Coupler Overhaul Procedure [Rev 0 approved February 28, 2017] review
 - Review of Policy Instruction: 10.4/1 Incident and Accident Investigation [approved May 29, 2018] review
 - Review of SAFE's SOP #800-01 Incident and Accident Process for BUS and RAIL review
 - Operation and Maintenance Manual Automatic and Semi-Permanent Couplers [Rev. January 6, 2008]
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - ARS playback [Radio, Ambient, and Phone Communications]
 - Maximo database [Maintenance History]

INVESTIGATION

On Friday, October 9, 2020, at 12:18 hrs., the Train Operator of Train ID 108, a Red Line 8-car 6000 Series consist [L 6074-6075.6079-6078.6113-6012.6067-6066 T] operating towards Glenmont Station, Track 1 experienced a Brakes in Emergency (BIE) condition between Union Station and NoMa-Gallaudet Station. The Train ID 108 Train Operator subsequently notified the Rail Operations Control Center (ROCC) Radio Rail Traffic Controller (RTC) of their train's condition. Train ID 805 Train Operator operating on the adjacent Track notified the ROCC that Train ID 108 had uncoupled between cars 6075 and 6079. At 12:21 hrs. Train ID 108 Train Operator verified their lead car's console reading two cars (the Train Operator did not immediately notice or report this after the consist BIE) and the Radio RTC instructed Train ID 108 Train Operator to make proper announcements to their customers and exit the train to perform a ground walk-around inspection. At 12:22 hrs., the ROCC Assistant Superintendent notified the DCFEMS of the unintentional uncoupling. At 12:26 hrs., the ROCC initiated a single-track between Judiciary Square and Union Stations by way of Track 2. At 12:29 hrs., Train ID 108 Train Operator notified the Radio RTC of a smoldering tie at Chain Marker (CM) B1-084+00 in the proximity of the uncoupled cars.

At 12:30 hrs., the Advanced Information Management System (AIMS) playback shows the ROCC de-energized third rail power on Track 1.

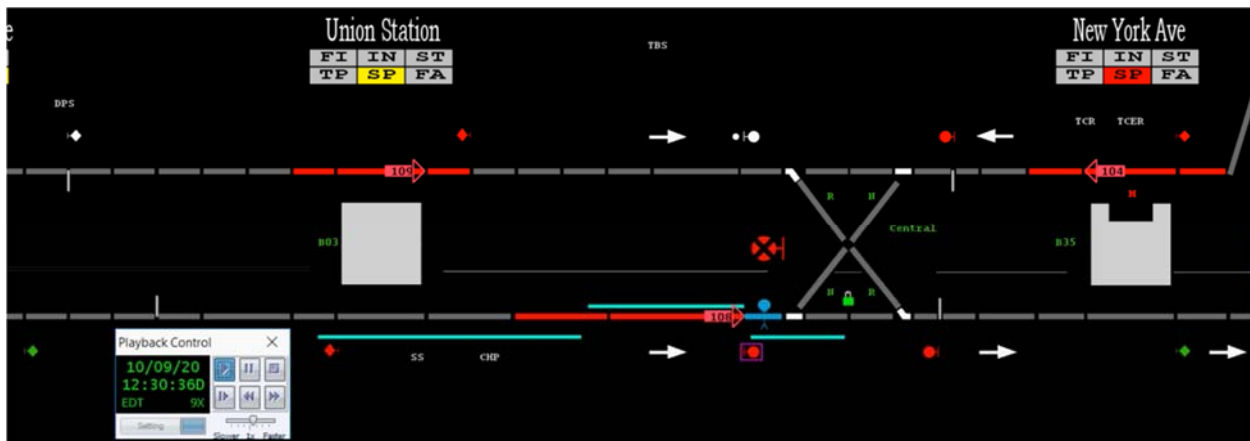


Figure 4: AIMS playback screen shot showing the ROCC de-energized third rail power, denoted by the teal/blue color. Track 1 on bottom; Track 2 on top.

Based on the AIMS, at 12:46 hrs., the Buttons RTC de-energized third rail power on Track 2.

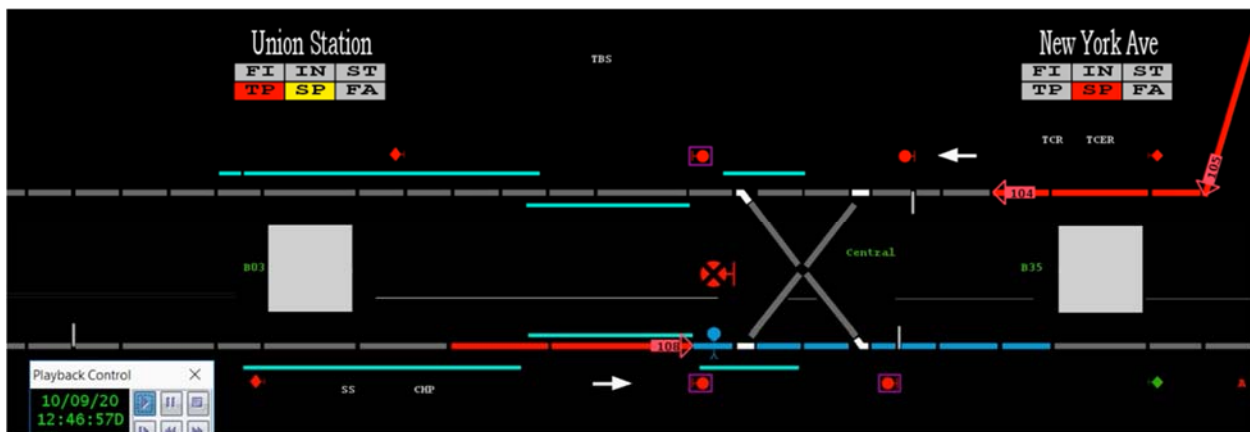


Figure 5: AIMS playback screen shot showing the Buttons RTC de-energized third rail power on Track 2.

At 12:54 hrs., DCFEMS Engine 12 and Amtrak Recon reported they positioned at the access gate to the Incident Commander to assist customers as they exited the affected consist. Amtrak Recon gave the authorization to DCFEMS to access the incident scene from the Amtrak's Supply Entrance at 700 block of First Street, NE. At 13:07 hrs., third rail power was de-energized on Track 1 at NoMa-Gallaudet Station, Track 1.

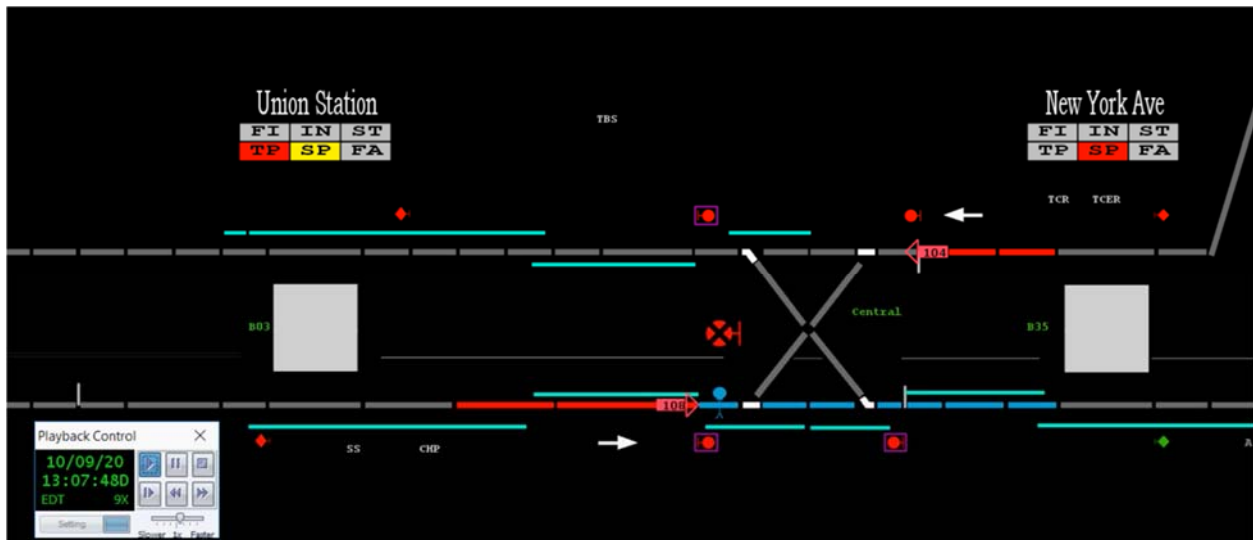


Figure 6: AIMS playback screen shot showing third rail power was de-energized on Track 1 at NoMa-Gallaudet Station.

At 13:08 hrs., a total count of 103 customers reported on the pull-apart consisting of 86 on the 6-cars and 17 on the married pair [6074-6075].

The RTRA Forward Liaison notified ROCC that one customer exited from the 6-car consist and was escorted back on the train. At 13:34 hrs., the Radio RTC instructed CMNT Road Mechanic to prepare to move the 6-car consist to Union Station; the Radio RTC also attempted to ascertain if the married pair [6074-6075] consist could be moved to Union Station as well. CMNT Road Mechanic reported that the married pair [6074-6075] consist was inoperable and would not move and will need to be recovered. The Radio RTC attempted to ascertain if the 6-car consisting can be moved within 2 feet of the married pair [6074-6075] to allow customers to board the 6-car consist. CMNT Road Mechanic reported that the closest the train can move would be within 4 feet due to the coupler assembly's condition.



Figure 7: Car 6079 – Front view of pull-apart (Spring pack with Automatic Couplers connected)

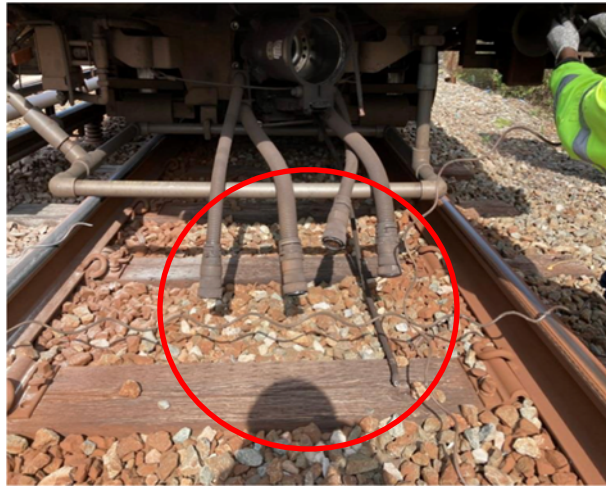


Figure 8: Trainline wiring/cables from Car 6075

At 13:36:49 hrs., The Radio RTC contacted the RTRA IC liaison over the radio with a plan to have customers board the 6-car train from the 2-car train and using the former to transport customers to Union Station; ROCC requests OSC to confirm the plan. At 13:39 hrs., the OSC informed the ROCC of the new customer evacuation plan per WMATA Incident Commander (IC) to evacuate customers through the Union Station side's access gate. OSC requested the ROCC provide a confirmation update when third rail power was brought down from Union Station to NoMa-Gallaudet Station. The Radio RTC notified the RTRA Forward Liaison that ROCC would not attempt to move the train; DCFEMS and MTPD would enter the roadway to perform customer evacuation. At 13:45 hrs., third rail power was de-energized on Track 2 NoMa-Gallaudet Station.

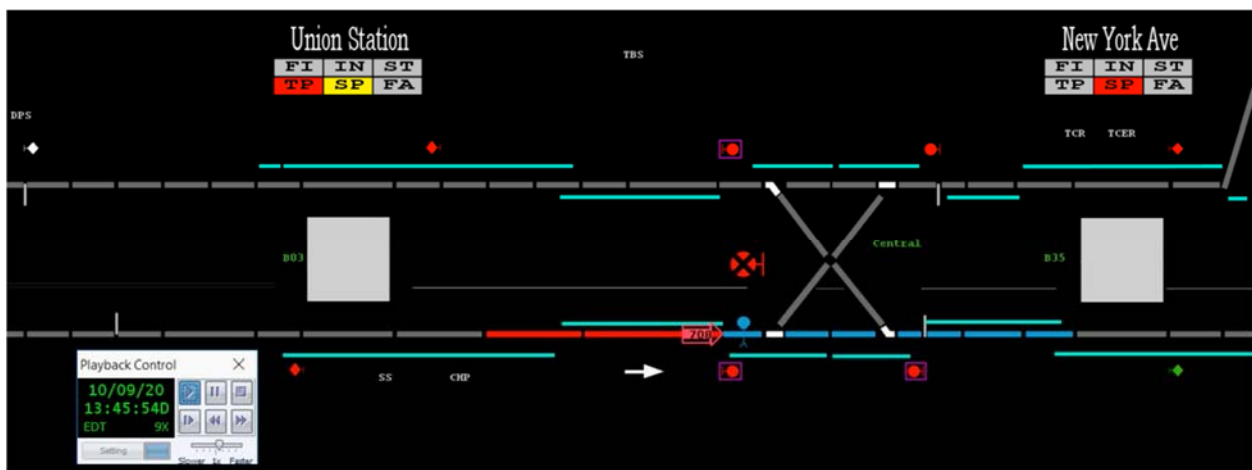


Figure 9: AIMS playback screen shot showing third rail power was de-energized on Track 1 and Track 2 at NoMa-Gallaudet station.

At 13:50:28 hrs., the Train ID 108 Train Operator reported customers began to exit the train and at 13:51:08 hrs., the RTRA Forward Liaison reported to the Radio RTC that two customers exited the train, were on the roadway, and with the DCFEMS. At 13:46 hrs., OSC stated that Amtrak Recon was clear to enter the trackbed. Amtrak Recon, Truck 7, and Squad 1 entered trackbed to setup Warning and Strobe Alarm Device (WSAD).

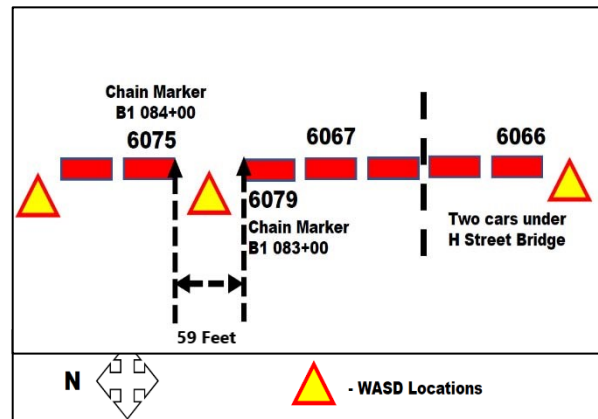


Figure 10: Locations and photo of the installed WSADs at the incident site.

At 13:59:28 hrs., the RTRA Forward Liaison reported to the Radio RTC that DCFEMS escorted all the customers from the disabled deuce safely to the Amtrak platform and at 14:08 hrs., the RTRA Forward Liaison reported to the Radio RTC that DCFEMS escorted all the customers from the 6-car consist safely to the Amtrak platform at CM B1-087+00. Two elderly customers requested assistance during the evacuation. DCFEMS requested a Gator vehicle to transport the customer for on-scene medical treatment.

Passengers were offloaded from the emergency side doors and not through the bulkhead doors as outlined within SOP 4 Customer Evacuation.

At 14:24 hrs., RTRA Forward Liaison reported to the Radio RTC that DCFEMS and all personnel and equipment cleared the roadway, and DCFEMS turned the incident over to RTRA. RTRA Forward Liaison said to the Radio RTC that third rail power could be restored. ROCC restored third rail power between Brentwood Yard and Union Station Tracks 1 and 2. A recovery train was dispatched from Brentwood Yard to transport the affected consist to Brentwood Yard for Post-incident inspection.

Upon arrival at the scene, SAFE reported to the Incident Command Post (ICP) and was able to see Train ID 108 on the roadway. SAFE was able to verify that the bulkhead doors were closed; SAFE observed RTRA personnel aboard the train positioned at the bulkhead door. Upon entry into the roadway, SAFE took measurements between the cars. SAFE measured a total distance of 59 feet between cars 6075 and 6079. SAFE also observed burn marks near the third rail at the pull-apart location at CM B1-084+00. SAFE confirmed from the Train Operator that the burn markings' location on the roadway was the location of an earlier reported burning cross tie.



Figure 11: Observed burn marks on the running rail near the pull-apart location.

SAFE also observed that the front mechanical coupler centering spring from Car 6075 made contact with the running rail, most likely causing the smoldering tie reported by the Train Operator.



Figure 12: Car 6075 mechanical coupler still attached to Car 6079.

SAFE personnel responded to Brentwood Service and Inspection Shop to conduct an on-site investigation of mechanical coupler pull-apart. Upon arrival, SAFE signed into the location and later received a safety briefing from the CMNT Shift Supervisor at Brentwood Service and Inspection Shop. The interlocking Operator and CMNT Supervisor then coordinated to have the incident cars [6075 and 6079] positioned on a lift upon arrival on 9A North and 9B South.

With CENV, CMNT Assistant General Superintendent, and CMNT technicians, SAFE inspected the affected consist and associated hardware. During this time, SAFE identified an intact and undisturbed torque stripe on the buffer tube bolt. The coupler head from Car 6075 was observed attached to Car 6079.

Based on the McLean Station event mentioned earlier, SAFE provided a potential probable cause during the inspection and requested the coupler be removed and transported to the MRO Shop based on previous practice to conduct testing in a controlled environment with appropriate calibrated tools. MRO personnel would attempt to reassemble the affected component and perform a torque value inspection and subsequent analysis of installed hardware.

Chronological Timeline of Events

A review of ARS playback (i.e., phone, ambient, and radio communications) revealed the following: (Radio Communication is not annotated).

12:18:51 hrs.	Train ID 108 Operator contacted the Radio RTC and reported that the train BIE and that they would attempt to recharge the train.
12:19:47 hrs.	Non-revenue Train 805 contacted the Radio RTC and reported that Train ID 108 was uncoupled between cars 6075 and 6079.
12:21:31 hrs.	Train ID 108 Operator reported to the Radio RTC the lead car's console is reading two cars in the consist. **Note: Train ID Operator did not immediately report this finding.
12:21:37 hrs.	ROCC Assistant Superintendent contacted DCFEMS to report the undesired uncoupling.
12:21:43 hrs.	Radio RTC instructed Train ID 108 Operator to make announcements to customers and perform a ground walk around. **Note: announcements did not reach all customers via train intercom.
12:22:43 hrs.	Radio RTC dispatched an RTRA Supervisor standing by Gallery and an RTRA Supervisor from another location to the scene.
12:23:18 hrs.	MOC Assistant Superintendent contacted ATC for single track support at Judiciary Square and Union Station.
12:24:16 hrs.	Radio RTC attempted to ascertain the location of Train ID 108 via CM. Train ID 108 Train Operator reported the train was at CM B1-084+00.
12:26:33 hrs.	Single-Tracking Operations were established between Judiciary Square and Union Station by way of Track 2.
12:28:00 hrs.	Radio RTC appointed the Train Operator as the OSC.
12:29:11 hrs.	Radio RTC instructed the Train Operator to report any hazards found during the ground walk around and report the total amount of customers aboard.
12:29:19 hrs.	Train ID 108 Operator reported a smoldering crosstie at CM B1- 084+00, where the cars are uncoupled.
12:30:50 hrs.	ROCC de-energized third rail power on Track 1.
12:32:05 hrs.	Train ID 108 Operator reported good ground walk around and confirmed the uncoupling at CM B1-084+00.

12:33:27 hrs.	RTRA Supervisor arrived on the scene; the Radio RTC appointed the RTRA Supervisor as the OSC. Radio RTC granted OSC to enter the roadway utilizing Foul Time protection.
12:35:22 hrs.	MOC Assistant Superintendent notified ERT of the reported fire and dispatched them for assistance at Union Station.
12:37:50 hrs.	OSC notified the Radio RTC of smoke emitting from the Track. Train ID 108 Operator reported that they utilized a fire extinguisher to extinguish the burning crosstie. The OSC confirmed that a fire extinguisher was used.
12:39:19 hrs.	The second RTRA Supervisor arrived on the scene and requested FT to access the down train.
12:45:58 hrs.	OSC confirmed third rail power is de-energized at CM B1 083+00.
12:47:06 hrs.	Button RTC de-energized third rail power Track 2 Union Station.
12:52:10 hrs.	Radio RTC appointed the OSC at the RTRA Forward Liaison and the second RTRA Supervisor appointed the RTRA IC, and that the ICP is located at Hopscotch Bridge.
12:53:47 hrs.	CMNT Road Mechanic arrived on the scene. Radio RTC granted CMNT Road Mechanic FT to walk to the down train.
12:57:33 hrs.	RTRA Forward Liaison reported to the Radio RTC that there were 86 customers on the trailing 6-cars.
13:02:35 hrs.	RTRA Forward Liaison reported notified the Radio RTC there was a total of 17 customers on the lead deuce of the consist.
13:06:18 hrs.	RTRA Forward Liaison reported that the DCFEMS requested permission to enter the roadway through an access gate B1 086+00.
13:11:30 hrs.	CMNT Road Mechanic on the scene reported that the coupler on Car 6075 was disconnected from the car and connected with Car 6079.
13:16:54 hrs.	CMNT Road Mechanic reported that they could tie an airline cable to the 6-car consist and move the 6-car consist back to Union Station.
13:18:00 hrs.	Radio RTC notified the RTRA Forward Liaison they received a report that customers had self-evacuated from one of the cars. Radio RTC instructed the RTRA Forward Liaison to ascertain from customers aboard if any customers exited the train.
13:20:10 hrs.	RTRA Supervisor reported 17 customers aboard the lead deuce.
13:21:47 hrs.	RTRA Forward Liaison reported that one customer exited from the 6-car consist and was escorted back on the train.
13:34:00 hrs.	Radio RTC instructed CMNT Road Mechanic to prepare to move the 6-car consist to Union Station. The Radio RTC also attempted to ascertain if the deuce can be moved to Union Station as well. CMNT Road Mechanic reported that the deuce was inoperable and would not move and will need to be recovered.
13:36:49 hrs.	Radio RTC contacted the RTRA IC Liaison to ascertain from the IC if ROCC can safely restore third rail power and move the 6-car consist back to Union Station.
13:38:51 hrs.	RTRA IC Liaison reported that the IC stated that ROCC could safely restore third rail power to move the 6-car consist to Union Station.
13:41:25 hrs.	Radio RTC attempted to ascertain if the 6-car consist can be moved within 2 ft of the deuce to allow customers to board the 6-car consist. CMNT Road Mechanic reported that due to the coupler assembly's nature, the closest the train can move would be within 4 feet.
13:47:57 hrs.	Radio RTC reported to the RTRA Forward Liaison that ROCC would not attempt to move the train; however, DCFEMS and MTPD would enter the roadway in preparation to perform customer evacuation.
13:50:28 hrs.	Train ID 108 Operator reported that customers began to exit the train.

13:51:08 hrs.	RTRA Forward Liaison reported to the Radio RTC that two customers exited the train were on the roadway and with the DCFEMS.
13:57:23 hrs.	RTRA Forward Liaison reported to the Radio RTC that handbrakes were applied on Car 6075 and Car 6079.
13:59:28 hrs.	RTRA Forward Liaison reported to the Radio RTC that DCFEMS escorted all the customers from the disabled deuce safely to the Amtrak platform at CM B1-087+00.
14:08:30 hrs.	RTRA Forward Liaison reported to the Radio RTC that DCFEMS escorted all the customers from the 6-car consist safely to the Amtrak platform at chain marker B1-087+00. DCFEMS remained on the roadway.
14:24:18 hrs.	RTRA Forward Liaison reported to the Radio RTC that DCFEMS and all personnel and equipment cleared the roadway and turned the incident over to RTRA.
14:30:44 hrs.	RTRA Forward Liaison reported to the Radio RTC that third rail power could be restored.
15:53:00 hrs.	ROCC restored third rail power between Brentwood Yard and Union Station Tracks 1 and 2.

Note: No radio communication issues reported or identified during this investigation

Office of Vehicles Program Services (CENV) Review

Dellner Couplers provide the 6000 Series coupler system. The design is based on a Married Pair system, including coupler equipment for the Front (F-end) Automatic Coupler and the Rear (R-end) Semi-permanent Coupler. Both couplers are anchored to the underframe of the car.

The Automatic Coupler is designed to enable the F-End of two cars to couple automatically. This coupler provides fully automatic mechanical, electrical, and pneumatic connections between married pairs. The Automatic Coupler consists of a mechanical hook coupler, two (2) side-mounted electrical couplers (which carry train-line electrical signals), various pneumatic valves (Duplex Solenoid, shut-off, Rotary Switch), and draft gear/drawbar with an emergency release feature.

The Semi-Permanent coupler is a flanged drawbar used to connect two cars' rear-end within a married pair. The drawbar is comprised of two semi-permanent halves (i.e., short couplers). The short coupler anchors, drawbar/draft gear are the same as those used on the Automatic Coupler.

Coupling is accomplished by bringing the F-end of two cars together at low speeds. As mechanical coupling occurs, the 'battery (B+)' contact pins of the electrical couplers engage and initiate the "coupling cycle." Power is applied to the Time Delay Relay to prevent false mechanical coupling. The Duplex Solenoid valve is energized and provides air to the Rotary Switch, which train-lines the electrical signals, and the Airline Shut-off valve, which opens the brake pipe cut-out cock sealing the pneumatic connection.

When the "Uncouple" signal is given from the cab, the Duplex Solenoid valve provides air to the Airline Shut-off valve, closing the brake pipe cut-out cock. Simultaneously the Rotary Switch is activated, which causes the uncouple valve to move, thereby breaking the connection of the electrical train-line signals and disengaging the mechanical hooks. Uncoupling of the mechanical & electrical coupler can be accomplished remotely from the operator's cab or at the coupler itself, using a manual release.

On October 9, 2020, the pull-apart incident involved the draft gear of the F-End Automatic Coupler and occurred when the “drawbar” (1) separated from the “buffer” tube (2).

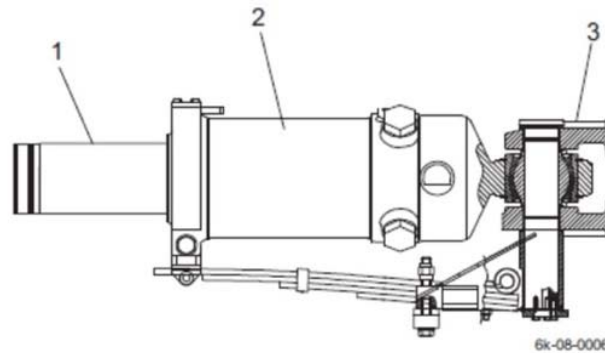


Figure 13: F-End Automatic Coupler: 1) Drawbar; 2) Buffer tube

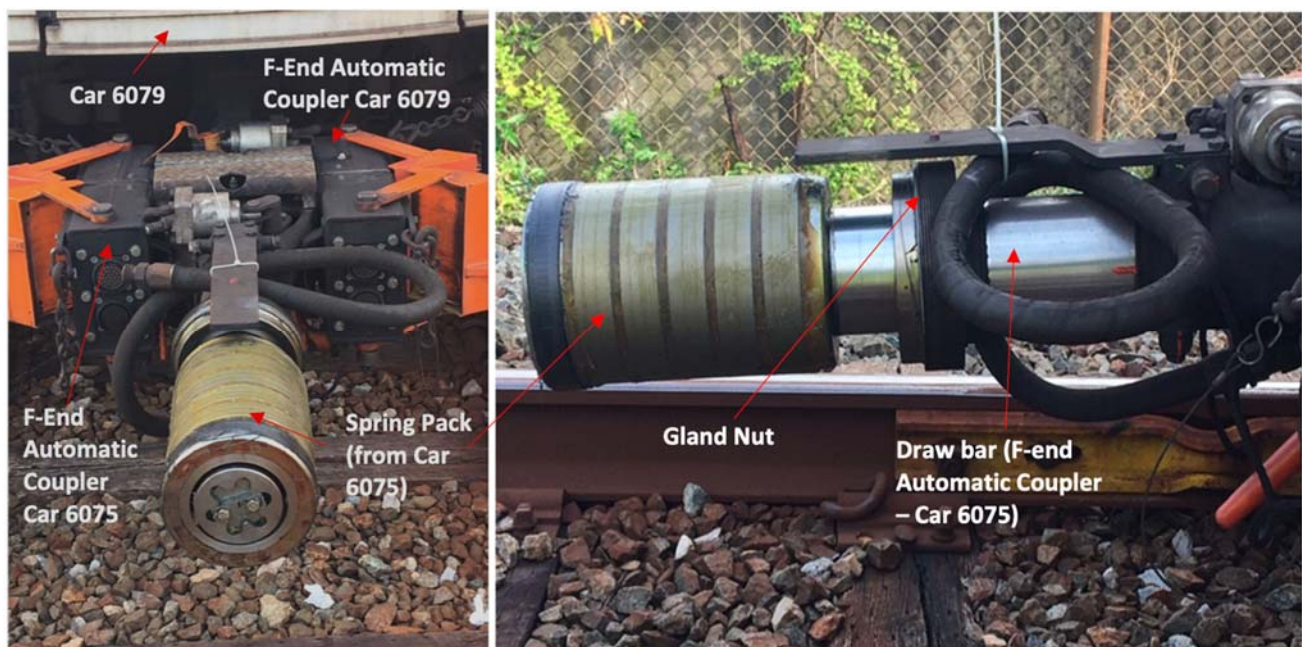


Figure 14a: Car 6079 – Front view of pull-apart (Spring pack with Automatic Couplers connected)

Figure 14b: Car 6079 – Side View of pull-apart (Spring Pack & Drawbar of car 6075)

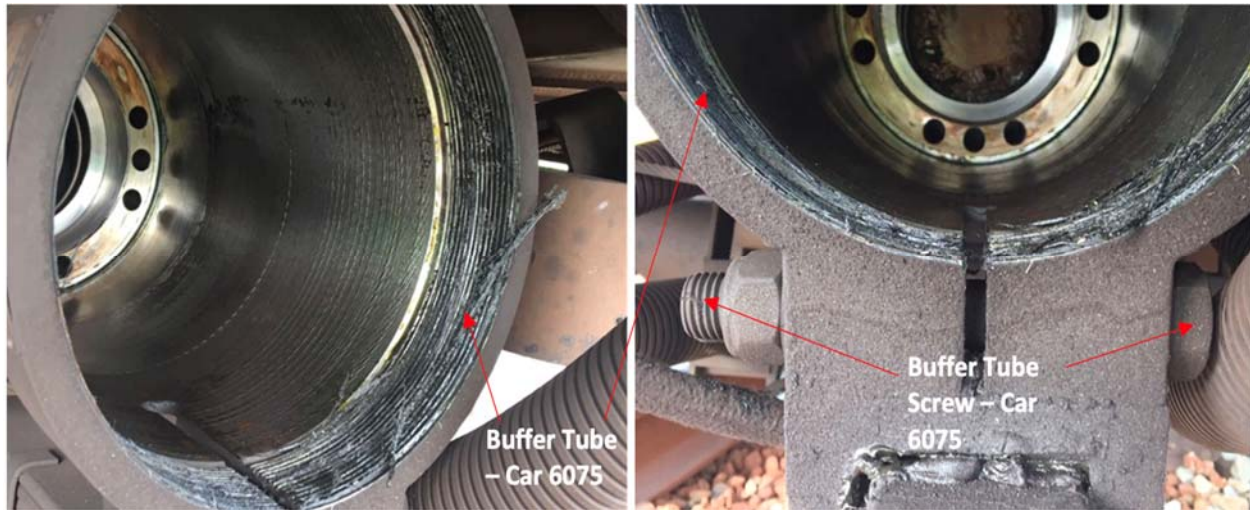


Figure 15a: Left – Car 6075 – F-End Buffer Tube

Figure 15b: Right – Car 6075 – F- End Buffer Tube and Buffer Tube Screw



Figure 16: Rust on the gland nut.

As seen below, the draft gear consists of the drawbar (1), buffer tube (7), gland nut (2), buffer tube screw, various bearings, guide rings, and a spring pack which utilizes horizontal and vertical articulation as well as resilience for buff (push) and draft (pull) forces. The gland nut holds the drawbar in place and encloses the spring pack within the buffer tube. In turn, the buffer tube screw provides the clamping force required to secure the gland nut.

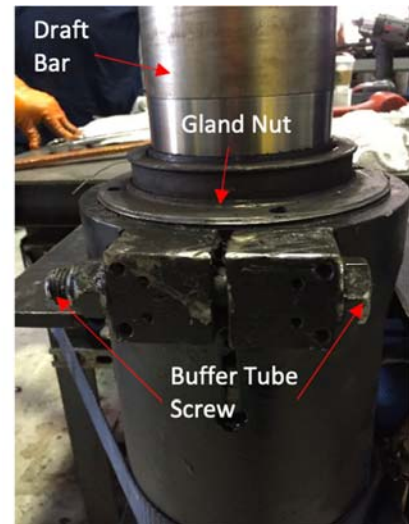
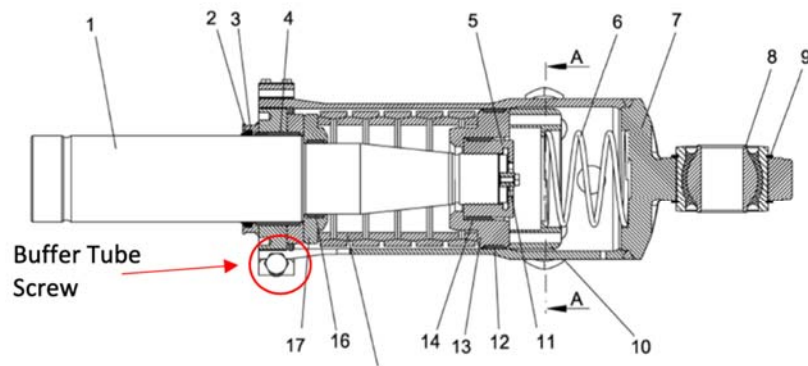


Figure 17a: Left – Exploded view of Front-End Draft Gear.

Figure 17b: Right – Photo of Draft Gear

After performing the on-site investigation, the cars were transported to Brentwood Yard, where the Buffer Tube/Drawbar assembly was inspected, then removed from the car and shipped to the Greenbelt MRO Shop for further analysis.

VMS data were downloaded once the cars arrived at the Brentwood Yard and analyzed. The results of the VMS data analysis are provided below.

The inspection/testing of the Buffer Tube/Drawbar assembly continued the morning of 10/10/2020 at the Greenbelt MRO Coupler Shop. The pull-apart contributing factor was inadequate clamping force due to the buffer tube screw's under torquing.

CENV Observations

Upon notification of the incident, CENV deployed Railcar Engineering personnel to the scene where the incident occurred. CENV was granted access to the incident scene after the safety briefing, and a PPE check was conducted. Below is a list of the initial CENV observations:

1. The Train ID 108 was found on Track 1, departing Union Station heading toward the NoMa-Gallaudet Station when the couplers connection broke between the two Car 6075 and Car 6079.
2. All cars were on the running rail with the third rail de-energized.
3. The trains were separated about 59 feet, and the Draft Bar portion of the Front Mechanical Coupler head had been completely removed from the Front Coupler Buffer Tube portion.
4. The train dumped the air, and an emergency brake was applied.
5. The buffer tube was attached to Car 6075, and the Front Mechanical Coupler was coupled to Car 6079.
6. The buffer tube lock screw and nut were intact.
7. The buffer tube and gland nut (installed in the draft bar) threads were dirty but not with apparent damage.
8. The guide rail mounted on the front mechanical coupler was slightly bent.
9. Due to the separation, the F end coupler electrical head cannon plug connectors and car to car air hose were ripped apart and damaged.
10. VMS data from lead car 6074 was downloaded and analyzed.

Vehicle Monitoring System (VMS) Analysis

The following is the timeline of the events logged by the onboard Vehicle Monitoring System:

1. Train ID 108 (L6074/75-6079/78-6113/12-6067/66T) left Union Station at approximately 12:14:10 with P5 power rate command and train length indicated 8-car consist.
2. At approximately 12:14:40 hrs., the train continued moving under the P5 power rate command. After traveling about 1149 feet from the Union Station, at a speed of 24 mph, the train length indication changed from 8-cars to 2-cars consist.
3. Approximately one second later, both cars 6074 and 6075 brake pipe dumped, followed by emergency brake application on the remaining six cars.
4. Finally, at approximately 12:14:52, Train ID 108 stopped after traveling about 172 feet since the train length indication changed from 8-cars to 2-cars consist (See VMS Graph below).

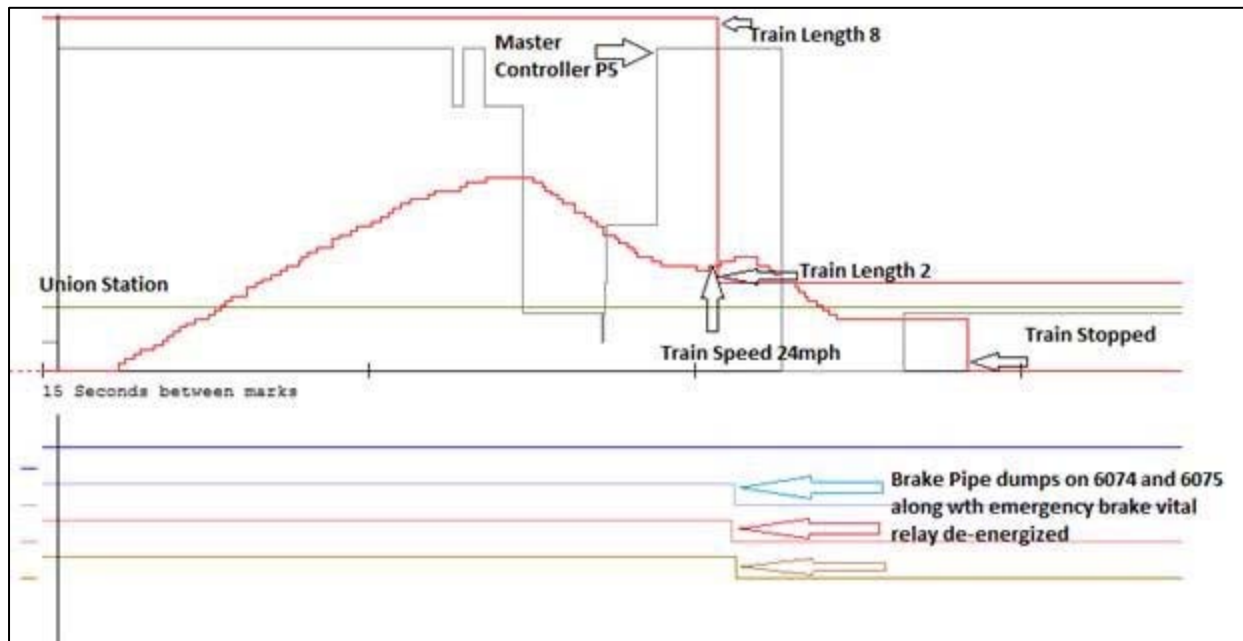


Figure 18: Graph of VMS data.

The VMS data does not indicate any train operation anomaly that could cause the reported incident.

Overhaul Shop Inspection and Testing

The front mechanical coupler of Car 6075, the associated buffer tube, and the front mechanical coupler head assembly (coupled with Car 6079) were removed by CMNT personnel at Brentwood Shop and transported to the Greenbelt MRO Shop for further analysis and testing. The front coupler inspection was done in the presence of CENV, CMNT MRO personnel, CMNT superintendents, SAFE, and WMSC.

The buffer tube was placed in the MRO shop horizontal stand fixture. It was noticed that the buffer tube clamp locking bolt (A4-80) torque stripe on the bolt and the nut was misaligned (see below).



Figure 19: Torque marks after the buffer tube was delivered in the MRO shop.



Figure 20: Torque mark on the same bolt pictured above prior to mechanical forces were applied.

Without touching the bolt, an attempt to install the gland nut in the buffer was conducted; however, it was not possible due to the tightened bolt.



Figure 21: Actuation of gland nut with tightened bolt.

Since the locking bolt and nut were previously tightened, the torque reading would not be valid for the demonstration of the original condition.

Next, the state of the buffer tube and draft gear gland nut threads were inspected. The locking bolt and nut were removed to release the clamp, and the buffer tube threads were cleaned. A new gland nut was installed into the buffer tube. No anomalies were noted.

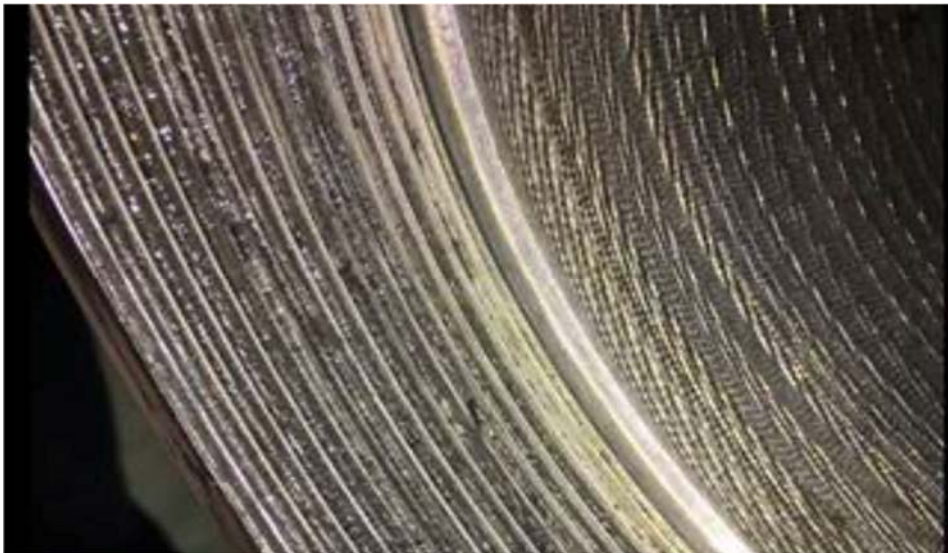


Figure 22: Buffer tube thread.



Figure 23: Gland nut application

A new A4-80 buffer tube screw was installed and torqued to 226 ft-lbs. to ensure the gland nut was not able to move (see below).

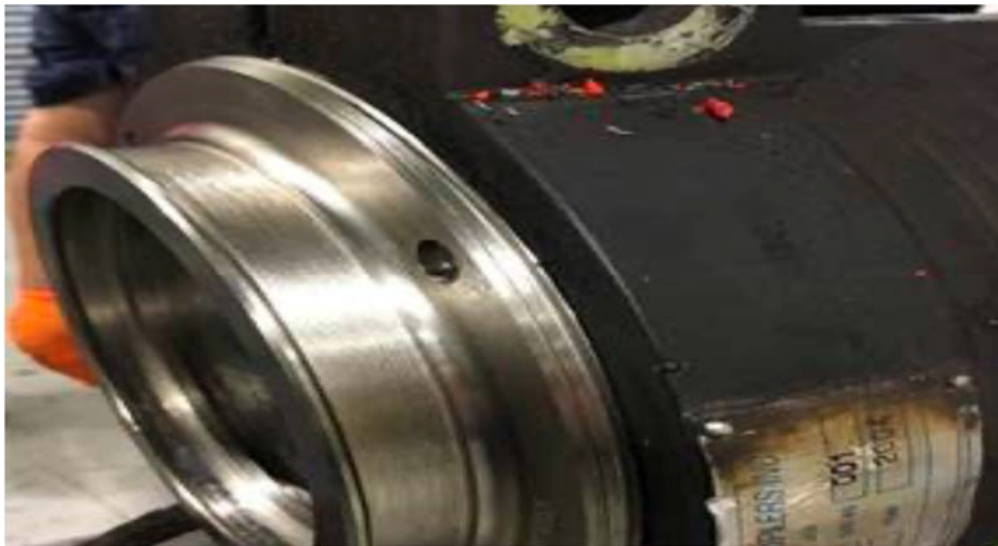


Figure 24: Locking bolt and nut installed

It was observed that the gland nut in the draft bar displayed signs (debris, brake dust, rust) of ambient exposure (out of the buffer tube) except for the last two or three threads (see below).

A new A4-80 buffer tube screw was installed and torqued to 226 ft-lbs. to ensure the Gland Nut was not able to move (see below).

It was observed that the Gland Nut in the draft bar displayed signs (debris, brake dust, rust) of ambient exposure (out of the buffer tube) except for the last two or three threads (see below).

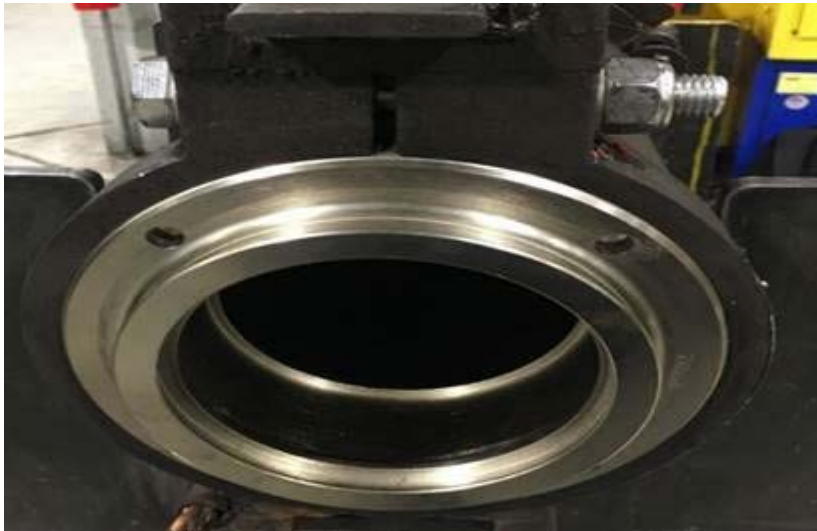


Figure 25: Locking bolt and nut installed

The buffer tube lock bolt and nut (A4-80) threads displayed no apparent damage or signs of bad thread deformation as well (see below).



Figure 26: A4-80 locking bolt

Additional CENV Findings

- CENV confirmed that the A4-80 bolt was originally installed in the buffer tube clamp.
- The torque value was unknown due to the manipulation of original hardware conditions.
- CENV did not identify cross-threading in the bolt, gland nut, and buffer tube.
- Signs of gland nut exposure to elements (out of the buffer tube) were observed.
- CMNT performed a fleetwide inspection in the 6000 Series car to confirm gland nuts are flush and hardware properly torqued.
- CMNT performed a fleetwide inspection of the 6000 Series car to confirm the correct hardware's buffer stem screw applied.
- CENV supported the incident investigation and contacted the OEM to clarify torque values and locking bolt specifications.

CENV Conclusion

The investigation of the pull-apart of Train ID 108 (Cars 6075 - 6079) was the result of inadequate clamping force on the buffer tube screw. The inadequate clamping force's contributing factor appeared to be insufficient torque on the buffer tube screw, which allowed the gland nut to slowly back out over time. This led to the draft bar (and spring pack) separating from the buffer tube, consequently causing the cars to separate.

The OEM documentation requires that fasteners be lubricated before installation. Visual inspection of the buffer stem screw from the incident indicates no lubrication was applied and that the buffer stem screw was dry torqued, resulting in insufficient torque (this requirement was not part of the WMATA's rebuild process)..

Office of Car Maintenance Review

As a result of this event, CMNT conducted a car inspection of all couplers on the 6000 Series fleet and identified the following information:

CMNT inspected a total of 184 cars (100% of the 6000 Series cars). CMNT identified 12 cars with discrepancies; nine cars had incorrect hardware installed on the flange collar/buffer tube clamp, and four cars had one gland nut thread showing.

Cost Analysis

CMNT Incident Cost Estimate

Incident#:	8506922								
Failure:	Train Coupler Pull Apart								
Date:	10/9/2020								
Shop:	Greenbelt MRO Annex								
Prepared by									
Rate:	\$76.00								
<i>Car(s)</i>	<i>Defect</i>	<i>Part</i>	<i>Cost each</i>	<i>Items</i>	<i>Total Parts</i>	<i>Hours</i>	<i>Rate</i>	<i>Total Labor</i>	<i>Total Cost</i>
6075	Coupler Inspections	Labor Hrs	\$0.00	0	\$0.00	24	\$76.00	\$1,824.00	\$1,824.00
6075	Coupler Overhaul Parts	Hardware	\$0.00	0	\$10,258.38	0	\$76.00	\$0.00	\$10,258.38
6075	Coupler Overhaul	Labor Hrs	\$0.00	0	\$0.00	44	\$76.00	\$3,344.00	\$3,344.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
Recovery			\$0.00	0	\$0.00	0	\$76.00	\$0.00	\$0.00
Totals					\$10,258.38	68		\$5,168.00	\$15,426.38

CMNT Incident Cost Estimate

Incident#:	8506922					
Failure:	Train Coupler Pull Apart					
Date:	10/9/2020					
Shop:	Brentwood MRO					
Prepared by:						
Rate:	\$76.00					
Car(s)	Defect	Total Parts	Hours	Rate	Total Labor	Total Cost
6075		\$10,281.90	122	\$76.00	\$9,272.00	\$19,553.90
6074		\$137.02	3.5	\$76.00	\$266.00	\$403.02
6079		\$0.00	8	\$76.00	\$608.00	\$608.00
6078		\$0.00	8	\$76.00	\$608.00	\$608.00
6113		\$0.00	0.1	\$76.00	\$7.60	\$7.60
6112		\$0.00	0.2	\$76.00	\$15.20	\$15.20
6067		\$0.00	1	\$76.00	\$76.00	\$186.20
6066		\$0.00	1	\$76.00	\$76.00	\$186.20
Totals		\$10,418.92	143.8		\$10,928.80	\$21,568.12

Car 6074-75 Maximo Work History

The Maximo history for the incident car was reviewed and it was determined:

- The coupler (asset number: 397023) was rebuilt on October 22, 2019;
- The coupler was installed on Car 6075 on November 8, 2019;
- Car 6075 underwent several inspections leading up to the pull-apart event;
 - A C4 Inspection occurred on January 16, 2020;
 - A A1 Inspection occurred on April 22, 2020;
 - A A2 Inspection occurred on June 16, 2020; and
 - A B Inspection occurred on August 21, 2020.

No post PI discrepancies indicate any anomalies with the coupler system on Car 6075. Additionally, there is no information stored within the data to reflect the use of calibrated tools to rebuild and install processes. Based on mileage data within Maximo, Car 6075 traveled 35,522 miles between the coupler replacement and subsequent pull-apart event.

Metro Transit Police Department (MTPD) Review

Based on the MTPD police report, the MTPD provided the following written statement:

On October 9, 2020, at approximately 12:27 hrs. the MTPD Officer received a radio run for Train ID 108, a 6000 Series train, that uncoupled in the tunnel between the Union Station and Noma-Gallaudet Station approximately 700 feet from the Union Station platform at CM B1-087+00. Passengers were on board the train.

Upon arrival to the scene, MTPD Sergeant became a forward liaison on the Union station platform; DCFEMS engine's 10, 16, and Ladder 3 were also on the scene and waiting for third rail power to be brought down and receive permission to enter the roadway. The MTPD Officer started an entry/exit log at the Union Station platform. MTPD Lt., fire liaison/supervisor, was on the scene. The ICP was set up near the incident train at the Hopscotch Bridge near the Amtrak yard's parking garage with emergency personnel. The third rail power was de-energized at 12:31 hrs., due to reports of passengers self-evacuating.

The passengers were brought back onto the train, and the Train Operator counted 108 passengers. At 12:44 hrs., a passenger reported patrons fighting on train Car 6079 due to panic. At 13:02 hrs., the Train Operator reported a smoking cross tie at CM B1-084+00, which was extinguished by a fire extinguisher by the RTRA Supervisor in the last car of the incident train. The ROCC attempted to move and reattach the train cars several times with no success before deciding to evacuate the train.

At approximately 13:57 hrs., 108 passengers were evacuated from the incident train to the Amtrak parking lot via access gate, and a bus bridge was established. At this time, two emergency management personnel, two personnel from SAFE, and eight firefighters entered the roadway from the Union Station platform to clear the train and were off of the tracks at approximately 14:25 hrs. DCFEMS completed the final inspection, and DCFEMS turned over the scene to MTPD. MTPD cleared the scene at 15:00 hours and turned it over to RTRA. Until their investigation was complete, CMNT Road Mechanic requested the cars not be moved.

MTPD report stated that five passengers claimed non-life-threatening injuries and one customer was transported to the hospital for a pre-existing heart condition.

Incident Emergency Response Debrief (49 CFR 239) Review

On November 23, 2020, WMATA hosted an after-action brief. Participants included the WMSC, the Office of Emergency Management (OEM), the District of Columbia Fire and Emergency Medical Services Department (DCFEMS) and internal WMATA stakeholders. The purpose of the debrief was to determine the effectiveness of emergency preparedness activities to improve or amend current processes. Recommendations developed as a result of this brief are included in the Recommendations / Corrective Action section below.

During the debrief, stakeholders noted the following:

1. Communication among all groups at the scene, internal and external, can be improved. It is critical that appropriate department decision-makers arrive on the scene in a timely manner and are prepared to make appropriate decisions.
2. Conveying accurate information regarding the nature of a possible emergency to jurisdictional emergency responders is critical to assisting these jurisdictions in determining their response postures. From the initial train operator report, the manner messages are received at the ROCC, and finally conveyed to the jurisdictions; all information must be timely and accurate.
3. Internal WMATA groups talking on different radio channels can't talk to each other. Need a dedicated incident command channel.
4. It is difficult for some operational groups to identify the command post location.
5. Improved common language must be used among all parties. This applies to describing the nature of the emergency incident, what is needed from others to mitigate or assist with the incident, progress reports as the incident progresses, and any incident closeout matters that need attention.
6. RTRA supervisors do not typically have the means to get to the command post if not at a station. They ride the train rather than have vehicles. They might need MTPD or others to get them to the command post.
7. Timely and effective hot sticking, WSAD placement, and ETEC cart access/usage continue to be among the most critical baseline aspects of rail incidents that need to be emphasized and practiced among the jurisdictions.
8. WMATA roadways are commonly found proximal to other railroad systems [CSX, VRE, Amtrak]. Opportunities exist for WMATA to give or receive assistance during emergencies in conjunction with these rail systems.
9. Conveying information and providing updates to customers on the disabled train was an issue during this incident. Provisions need to be developed or reinforced for conveying accurate and timely information to customers, especially when power is down on the consist.
10. Radio traffic and emergency scenes tend to become very busy locations and can easily become hectic. Evacuees, media crews, and others need to be directed by appropriate WMATA staff.

11.

Interview Findings

SAFE conducted 15 interviews via virtual Microsoft Teams. These interviews were conducted over one-month span after the event and identified the following key findings associated with this event, as follows:

Chain of Custody Breakdown

The following provides the chain of custody breakdown based on the interviews of eight CMNT personnel:

On October 9, 2020, at approximately 17:00 hrs., SAFE, CMNT and CENV arrived at the Brentwood yard to conduct an on-site inspection of Car 6075 and Car 6079 front couplers. Once the railcars were in the shop, all the stakeholders present proceeded to inspect the railcars for anomalies; at this time, the group identified the failure to be similar to the 2018 McLean Station pull-apart event. There were several photos taken of the condition of both sides of the coupler, including the bolt and nut installed on the buffer tube to apply clamping force to the gland nut. The bolt and nut were intact with no evidence of mechanical forces being applied, with the torque stripe on the nut side still intact.

Deputy Chief Engineer (DC CENV) was in communication with the Chief Mechanical Officer (CMO) and was being instructed to check the torque values of the clamping hardware at the Brentwood Shop. DC CENV requested assistance from the Brentwood MRO Supervisor to check the torque as instructed by CMO. CMNT Technicians were instructed to locate the necessary tools to perform the torque value verification and were not able to acquire a torque wrench that could measure up to 226 ft-lbs. Based on lessons learned from the McLean Station incident, and discussion with CMNT, CENV and SAFE personnel, it was agreed that the teardown and inspection of the coupler and associated component be performed at the Greenbelt Major Repair and Overhaul (MRO) Shop under a controlled environment and with the appropriate tools. When the CMNT Technicians returned with the necessary tools, they were instructed by DC CENV to hold off and wait for further instructions. No torque test was conducted at that time.

The group returned to the Brentwood Inspection Office where the details of the next steps were discussed by CENV, CMNT, and SAFE personnel. The agreement was to remove the coupler from the railcar, transport it Greenbelt MRO Shop. CMNT would take the necessary actions to provide two technicians for the teardown, and the group would reconvene at the Greenbelt MRO Shop at 8:00 hrs., on Saturday, October 10, 2020. The Brentwood MRO Supervisor received verbal instructions and was asked if they understood the next steps in the process; to which they replied, yes. The instructions were repeated to only remove the coupler from the railcar to not disturb the clamping bolt, shrink wrap it and transport it to the Greenbelt MRO Shop. They acknowledged the instructions and departed the Brentwood Inspection Office.

On Saturday, October 10, 2020, at approximately 07:30 hrs., at the Greenbelt MRO Shop, WMSC, SAFE, CENV, and CMNT personnel noticed that the clamping bolt had been tampered with due to the broken torque stripe and signs of mechanical forces having been applied to the bolt and nut. A discussion between the groups took place to find out if anyone had instructed maintenance personnel to take torque measurements prior to the arrival at 08:00 hrs. All present declined knowledge of any manipulation of the clamping bolt.

At approximately 08:17 hrs., the Brentwood MRO Supervisor was contacted via phone and was asked if their group had taken any measurements on the clamping bolt and replied, no; however, they called their senior technician to verify. Shortly after, the Brentwood MRO Supervisor emailed back and stated that their technician had taken the torque reading as originally instructed.

The probable cause of the chain of custody breakdown was a lack of communication with the CMNT Technicians assigned to remove the coupler. The initial instructions were to check the torque values on-site at Brentwood Shop; however, a change of directions was agreed upon in the absence of the CMNT Technicians and that information was never conveyed to them. They proceeded to check the torque value and remove the coupler to ship it to Greenbelt MRO Shop.

Incident Response Personnel:

ROCC personnel involved stated the Train Operator reported their train would not recharge and did not report how many trains were in their consist. The Troubleshooting guide does not state the Train Operators must report trains in their consist. The Buttons RTC noted customers began opening doors due to power being de-energized, and the train cabin began to get hot due to lack of HVAC. The Buttons RTC stated they did not instruct the Train Operator to notify customers on both sets of consist. The Buttons RTC did not recall if the Radio RTC instructed the Train Operator to lock the bulkhead doors on the separating consist. The RTRA Supervisor cannot remain at the bulkhead doors when notifying customers. The Buttons RTC said the bulkhead doors were open for ventilation. The ROCC Assistant Superintendent stressed the two-car consist had a great chance of gapping [to lose power] traversing the interlocking, and the train would potentially require recovery. The ROCC Assistant noted ROCC received three reports of customers exiting to the roadway, which in turn required a headcount, ultimately extending the passenger's time aboard the train. The ROCC Assistant Superintendent noted they did not have enough personnel at the incident train to institute SOP 4 on four open ends of the train due to customers continuing to exit onto the roadway. The ROCC Assistant Superintendent noted they were the only management personnel at the ROCC that day. The ROCC Assistant Superintendent did not receive any notifications of injuries.

RTRA personnel involved stated that the Train Operator noted the train brake pipe dumped, and the Train Operator attempted to recharge the train; one of the customers notified the Train Operator via emergency call station. The customer stated that the train derailed/ came apart; a train traversing on the adjacent track said they experienced an undesired uncoupling. During the inspection, the train operator identified the lead two-car consist uncoupled from the eight-car consist. The Train Operator identified two couplers attached. The Train Operator noted they did not inspect the train rotaries. The Train Operator stated after ROCC de-energized the third rail, the Train Operator could still make announcements. The Train Operator did not feel any jolts or jerking before the BIE condition. The Train Operator stated that they do not recall ROCC instructing them to apply handbrakes; however, handbrakes were applied on both cars after the ground walk-around. They used the ladder on the side doors and assisted customers down to the roadway. Amtrak opened the access gate, and customers were evacuated from the roadway. The Train Operator noted the front bulkhead door on the second car within the lead two-car consist was not locked before entering the roadway. The Train Operator said the trailing bulkhead door was not open for customers after power was de-energized on the 6-car consist. The Train Operator noted the evacuation took too long for passengers. The Train Operator stated the environment was hostile on the train; customers were yelling and arguing. The Train Operator said MTPD was not at the incident location to support the event.

CMNT personnel involved stated, they did not board the train until the customers were evacuated. The CMNT Road Mechanic noted the Train Operator made train announcements via train intercom, but unsure how many times the Train Operator made announcements. The CMNT Road Mechanic said when they arrived, there was no smoke condition. The CMNT Road Mechanic said the coupler springs stretched from the pull-apart and appeared to have touched the third rail or running rail, which caused the smoke event. When the CMNT Road Mechanic began securing the cables and airlines, third rail power was down. The CMNT Road Mechanic did not recall who confirmed third rail power was de-energized. The CMNT Road Mechanic

observed customers exiting the train to the roadway and an RTRA Supervisor escorted the customers back onto the train. The CMNT Road Mechanic noted that the customers were young. The CMNT Road Mechanic did observe passengers open the side of the incident train; the CMNT Road Mechanic noted that an RTRA Supervisor was positioned near the bulkhead end doors. The CMNT Road Mechanic was not familiar with emergency SOP 13 and SOP 1A.

IMMEDIATE MITIGATIONS TO PREVENT RECURRENCE

- The ROCC removed Train ID 108 from service for post-incident inspection
- Vehicle Program Services (CENV) developed a Maintenance Service Inspection (MSI) 150088 outlining rebuild procedures for the 6000 Series Semi-Permanent Drawbars and any other action deemed necessary to support the prevention of repeated pull-apart event.
- CMNT conducted a fleetwide inspection for immediate mitigation purposes. CMNT identified 12 cars with discrepancies; nine cars had incorrect hardware installed on the flange collar/buffer tube clamp, and four cars had one gland nut thread showing.

INVESTIGATION FINDINGS

- Based on a review of on-scene photographs, DCFEMS did not evacuate customers from the affected consist as outlined in the MSPRH 4.5.6.3, which states, *“An emergency ladder stored in the end car, shall be securely positioned between the end door of the car and the roadbed.”*
- Based on available information, Power personnel were not in compliance with MSPRH 4.5.6.2.3, which states, *“Power personnel are available at the involved substation and the tiebreaker station to rack out and tag the circuit breakers that are tripped when third rail traction power is removed by supervisory control.”*
- Based on a review of available data, the Train Operator and ROCC were not in compliance with 13.5.6.1.2. which states, *“Close and lock the end doors of the cars where the pull-apart occurred.”* And MSRPH 13.5.2.1.5, *“If between stations, close and lock the doors where the uncoupling occurred and notify the customers in the rear section of the incident.”*
- There is no procedure within the MSRPH under “Pull-Apart” that defines trains’ processes when damaged during the event detailing steps and movement if possible, and to include communicating with both end of the separated consist.
- Based on available information, the MOC Assistant Superintendent was not in compliance with the Standard Operating Procedure (SOP) 1A.5.1.4.1 *“Appoint the initial Maintenance Commander.”*
- Based on MTPD reports, the RTRA Supervisor did not report to the ICP location after several requests.
- Based on the MTPD report, there were a total of 108 customers evacuated. Five passengers claimed injury, non-life-threatening, and one customer was transported to the hospital for a pre-existing heart condition. **Note: There was a count deficiency of 108 reported by MTPD vs. 103 reported by RTRA.**
- Train ID 108 stopped after traveling 172 feet after the train length changed from eight to two cars.
- Approximately 12:14:10 hrs. Train ID 108 [L6074.6075-6079.6078-6113.12.6067.6066T] left Union Station in P5, train length is 8-cars
- Approximately 12:41:41 hrs. after traveling 1149 feet at 24 mph in P5, train length showed 2-cars.
- The smoldering tie was most likely caused by the stretched out front mechanical coupler spring after it contacted the running rail.
- CENV confirmed that CMNT initially installed the A4-80 bolt in the buffer tube clamp.
- The torque value was unknown due to the manipulation of original hardware conditions.

- CENV did not observe any cross-threading evidence in the bolt, gland nut, and buffer tube.
- CENV observed that the gland nut was exposed to elements (out of the buffer tube).
- CMNT performed a fleetwide inspection in the 6000 Series car to confirm gland nuts are flush and hardware adequately torqued.
- CMNT performed a fleetwide inspection of the 6000 Series car to confirm the correct hardware's buffer stem screw applied.
- CENV supported the incident investigation and contacted the OEM to clarify torque values and locking bolt specifications.
- The MSI procedure does not reflect using lubrication as required by the OEM rebuild process.
- CMNT did not have adequate documentation for OJT.
- The CMNT MRO rebuild mechanics had six months of experience in the rebuild shop.

WEATHER

At the time of the incident, NOAA recorded the temperature at 71°F, and SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: Washington, DC.)

HUMAN FACTORS

Fatigue

The employee's 30-day work schedule leading up to the incident was compliant with *WMATA's Policy/Instruction 10.7/1 Hours of Service Limitations for Prevention of Fatigue*. It did not present a significant risk of impairment due to fatigue. Based on employee interviews, there were no personal factors present that would have increased the likelihood of fatigue-related impairment. The employees had no history of sleep issues to report.

Post-incident Toxicological Testing

At the time of this incident, ROCC managerial staff did not remove any ROCC staff for post-incident testing. Under WMATA's current Drug and Alcohol Policy and Testing Program Policy Instruction 7.7.3/5, Post-Incident Testing may be performed on employees and contractors whose performance cannot be "completely discounted."

PROBABLE CAUSE

The probable cause of the pull-apart event between Union Station and NoMa-Gallaudet Station on October 9, 2020, involving Train ID 108 cars 6075 and 6079, was procedural deficiencies and the absence of a Quality Management System; improper prior overhaul and repair during the rebuild process of the failed mechanical coupler. Based on investigative findings, an inspection of the fasteners indicated the buffer stem screw was not lubricated as required per OEM procedures and dry torqued.

As a result, the flange collar did not achieve adequate clamping force due to insufficient torque on the buffer tube screw, which allowed the gland nut to slowly back out over time. Consequently, the draft bar (and spring pack) separating from the buffer tube, causing a pull-apart event.

A review of the 6000 Series under-car PI procedure review determined there is no instruction to inspect the front-end mechanical coupler gland nut threads or check the coupler's vertical movement.

RECOMMENDATIONS/CORRECTIVE ACTIONS

The following are the recommendations and corrective actions identified as a result of this investigation. These recommendations and corrective actions are tracked using WMATA's Safety Measurement System Incidents/Accidents (SMS I/A) Module and are verified by SAFE upon completion. The responsible department is identified in the corrective action code. Refer to the SMS I/A module for additional information.

Corrective Action Code	Description
89444_SAFECAPS_CENV_001	Undertake a review of MSI 150088 (Front Mechanical Coupler Overhaul) and MSI 150901 (Semi-permanent Drawbar Overhaul) to implement a quality control process for safety-critical components to identify possible deficiencies with process, tools, hardware and alignment with OEM manufacture rebuild processes. Additionally, the MSI shall further require torque striping to be applied to all fasteners and components to easily identify undesired movement between maintenance cycles.
89444_SAFECAPS_CENV_002	Undertake a review of the 2000-3000 Series front coupler and semi-permanent drawbar rebuild procedures to ensure their alignment with OEM manufacture rebuild processes to identified.
89444_SAFECAPS_CENV_003	MSI 150088, Front Mechanical Coupler Overhaul, shall be revised to correct all torque values and applications (wet vs. dry). The MSI shall further require torque striping to be applied to all fasteners and components subject to torque.
89444_SAFECAPS_CENV_004	(MSI) 150088, Front Mechanical Coupler Overhaul shall be revised to require the application of Loctite 243, medium strength adhesive, on fasteners as a design improvement.
89444_SAFECAPS_CENV_005	Revise the 6000 PI procedure to require visual inspection of couplers and fasteners.
89444_SAFECAPS_CENV_006	Develop and institute a quality assurance process to ensure correct fasteners are utilized during the overhaul process.
89444_SAFECAPS_CENV_007	Develop and institute a quality assurance process to ensure correct torque and torque striping are applied during overhaul.
89444_SAFECAPS_CENV_008	Develop a Quality Compliance Group for CENV, whose primary responsibilities shall be auditing CMOR shop practices and policies.
89444_SAFECAPS_CENV_009	CENV reorganization into Legacy Engineering and New Car Procurement groups. This reorganization ensures that additional oversight will be placed on revenue service fleets, and appropriate resources will be immediately available to investigate and address incidents.
89444_SAFECAPS_CMNT_010	Revise the 6000 PI procedure to require physical vertical movement of coupler horn to identify play in the gland nut and require a visual inspection of couplers and fasteners to include gland nut threads.
89444_SAFECAPS_MTPD_011	Explore limiting staff responding to emergencies to only needed staff. Consider staging train recovery staff, cleanup staff away from the immediate area of the incident until needed. Limit command post representatives to only one staff member from each operational group, with SAFE, OEM and MTPD being the only exception. Designate

	intermediate staging areas to keep unnecessary people away from the emergency scene.
89444_SAFECAPS_OEM__012	Design, and schedule WMATA internal emergency incident workshops for appropriate operational groups to practice and enhance awareness on managing emergency incidents.
89444_SAFECAPS_OEM__013	Develop, or enhance emergency response plans with Amtrak CSX and VRE agencies. Incorporate these stakeholders into training and full-scale exercises when possible. Assist the COG Passenger Rail Safety Committee in facilitating these plans for vetting across the regions.
89444_SAFECAPS_OEM__014	Employ a means to identify the ICP location and appropriate responsible parties physically. Provide a visual landmark, signage, armbands, helmet identifiers.
89444_SAFECAPS_OEM__015	Establish a dedicated common radio channel for appropriate operational groups during emergency incidents.
89444_SAFECAPS_OEM__016	Undertake a review of emergency incident training to identify opportunities to incorporate as many Train Operators, RTRA Supervisors, and similar staff to identify and convey pertinent information.
89444_SAFECAPS_OEM__017	Reinforce common language when conveying information, especially among operational stakeholders who might not always focus on emergency response and management matters.
89444_SAFECAPS_OEM__018	Develop or reinforce a platform for operational stakeholders to access the ICP as appropriate.
89444_SAFECAPS_OPMS_019	Undertake a review of developing customer de-escalation training for Train Operators, CMNT Road Mechanics, RTRA Supervisors, and emergency responding personnel.
89444_SAFECAPS_ROCC_020	Establish an emergency management team for events that will directly affect RTC's ability to oversee normal operations on the roadway, i.e., directing traffic around the incident and troubleshooting mechanical breakdowns.
89444_SAFECAPS_ROCC_021	Conduct skill drills with ROCC staff to simulate an emergency response to a pull-apart scenario with smoke conditions under a de-energized third rail and provide critical feedback to employees on their actions and performance during these exercises.
89444_SAFECAPS_ROCC_022	Undertake a review of communication processes with Fire Liaison and the ROCC Assistant Superintendent during emergency events. Incorporate a WMATA desk cordless phone to communicate changes with OSC, Fire Liaison, and ROCC Assistant Superintendent to streamline information during the ROCC Assistant Superintendent engagement with the affected console.
89444_SAFECAPS_ROCC_023	Undertake a review of managerial scheduling to minimize operational gaps, i.e., have an Assistant Superintendent and Superintendent of ROCC scheduled for each shift.
89444_SAFECAPS_RTRA_024	Develop lessons learned to discuss processes and procedures during a pull-apart and smoke event to include communication responsibilities on both ends of the separated consist.
89444_SAFECAPS_SAFE_025	Undertake a review of MSRPH to identify opportunities to improve ADA coverage in the event of an emergency.
89444_SAFECAPS_SAFE_026	Undertake a review of SOP 800-01 and develop the chain of custody process line to maintain the integrity of investigation. Note that this was also issued by the WMSC as finding number WMSC-20-C0070.

APPENDIX A – CMNT MEMORANDUM

Page 1 of 2



M E M O R A N D U M

SUBJECT: Rail Vehicle Unusual
Occurrences, Offloads and
Delays

DATE: October 16, 2020

FROM: VP & CMO [REDACTED]

TO: General Superintendent – [REDACTED]

The purpose of this memorandum is to define the steps required to be executed by CMNT staff prior to releasing rail vehicles which are under investigation and/or control of CENV or the Incident Investigation Team (IIT) personnel back to revenue service.

Once a mainline incident occurs, ROCC/CMNT notifies the affected shop when a consist is involved in an unusual occurrence or an incident, which results in a delay and/or offload. When the consist arrives in the yard, the supervisor on-duty is responsible for the following:

- Having personnel physically verify the car numbers of the consist.
- Opening the related incident in Maximo and take the consist out of service.
- In the event the reported consist is in the yard and is not displaying an incident in the RPM, contact ROCC/CMNT Controllers and have them add the car number(s) to the original incident.
- Notifying CENV/IIT when the train is physically in their respective yard via the associated email thread.

For unusual occurrences, as defined in CMNT SOP 1.11, or by request from SAFE, a CENV or an IIT team member will report to the respective location and download the necessary files to begin the investigation.

CMNT Supervisors are expected to:

1. Ensure Blue Flag protection has been established on the consist in question, in accordance with MSRP SOP 29 for the CENV and/or IIT members.
2. Prevent other personnel from accessing the affected cars.
3. Await update from CENV/IIT team member(s).
4. Open work orders on any additional findings reported to them by CENV/IIT while investigating the consist reported defect(s).
5. Consist is not to be released back to revenue service without a notification of release from either CENV or IIT.
6. If a SAFE and/or MTPD hold has been placed on the consist, a separate notification from the impacted office is required.

Washington
Metropolitan Area
Transit Authority

For unusual occurrences due to extensive delay times for rail vehicle(s) that were offloaded due to mechanical failures, CMNT Supervisors must:

1. Dispatch personnel to perform initial inspection and download necessary data as outlined in CMNT Special Instruction SIP 7001, Incident Download Guide and Required Initial Checks.
2. Upload files to the appropriate Q-drive location and Notify CENV/IIT via the associated email thread once uploaded is complete.
3. Concurrently, while awaiting feedback from CENV/IIT, CMNT should proceed with troubleshooting efforts.
4. Comply with all CENV/IIT team members recommendations prior to releasing the vehicles back to revenue service.
5. Open work orders on any non-failure related findings reported to them by CENV/IIT while investigating the incident and address reported issues prior to returning cars to revenue service.
6. No rail vehicles are to be released back to revenue service without a Hold release from CENV/IIT team member(s).

APPENDIX B – INTERVIEW SUMMARIES

Chain of Custody Interview

CMNT Mechanic B

The Mechanic is a WMATA employee with two years of service and experience as a mechanic.

Mechanic B stated the following associated with the chain of custody event on October 9, 2020.

Mechanic B did not receive any instructions to assist with torque valve testing. The Mechanic recalls a CENV and CMNT posed a question to check the affected coupler's torque valve. The Mechanic then assisted CMNT personnel with lift malfunction repair to conduct the checks. Once the lift was functional, the Mechanic went into the office to ascertain if CENV and SAFE were still performing the torque valve checks. The Mechanic noted, the inspection office Assistant Superintendent stated SAFE and CENV were done for the day. The Mechanic noted the instructions were unclear. The Mechanic returned to the train and informed the other mechanics they were done for the day. Later the mechanic supervisor instructed the personnel to remove the front couplers on both cars. During the interview, the Mechanic did not recall specific SAFE instructions that CMNT would not conduct the torque valve checks. The coupler would be removed and sent to MRO for controlled environment testing. The Mechanic did not recall if the torque valve checks were performed.

CMNT Mechanic Helper

The Mechanic Helper stated the following associated with the chain of custody event on October 9, 2020.

The Mechanic Helper is a WMATA employee with five months of service and experience as a mechanic.

The Mechanic Helper's Supervisor brought personnel to the inspection office to assist CENV with torque value checks. CENV personnel provided a torque value specification for testing. The Mechanic helper and other mechanical personnel gathered torque wrench, socket, and all appropriate PPE. After the first break from 17:00-17:10 hrs., the mechanics headed to the floor and encountered difficulties with the train lift. Approximately 30 minutes later, the Mechanic Helper and other mechanics went to the front coupler. When the mechanics were in front of the coupler, they did not observe any personnel. The Mechanical coupler noted they followed the instructions; they were not told SAFE or CENV were leaving or when they would be back. The Mechanical Helper stated that, as instructed by a person from SAFE, they did what was instructed to get the torque value. During the virtual interview, the Mechanic Helper did not identify on-site SAFE personnel as persons giving any instructions. The Mechanic Helper noted they conducted the torque value test and notified their Supervisor before taking their meal break at approximately 19:00 hrs. The Supervisor instructed the mechanics to leave the torque wrench near the coupler for the asset number documentation. The Mechanic Helper said they did not record any value checks.

The MRO Supervisor

The MRO Supervisor is a WMATA employee with 17 years of experience as a Supervisor and 21 years of service. The MRO supervisor held various positions, such as inspection office Supervisor and Mechanic positions.

The MRO Supervisor stated the following associated with the Chain of custody event on October 9, 2020.

Once the train arrived, the MRO Supervisor met with Safety at approximately 16:30 – 17:00 hrs. Note: The MRO Supervisor could not recall exactly what occurred early on. The MRO Supervisor and SAFE discussed the removal of the front coupler on the incident cars. After that, the MRO Supervisor left the inspection office. Later on, the MRO supervisor received a call from the Assistant Superintendent for a torque value check of the incident train. At approximately 19:30 – 20:20 hrs. the MRO Supervisor escorted two mechanics to the inspection office to assist. CENV stated they wanted the gland nut bolt checked. After that, the MRO Supervisor left the inspection to continue their supervisory duties. Two hours later, the MRO Supervisor instructed the two mechanics to drop the coupler, secure, and tag the asset. Then the Inspection Office transported the coupler to the Greenbelt rebuild shop. Note: Again, the MRO Supervisor noted, they were unable to recall times, and they might be off.

During the virtual interview, the MRO Supervisor noted the mechanics did not notify them the torque value test was complete before [meal break] 19:00 hrs. After meal break, the Mechanics reportedly provided an update and told the MRO Supervisor the lift was not working. CENV left the area, and they continued with the previous instructions to take the torque value. The MRO Supervisor recalled SAFE mentioned wrapping the incident coupler after removal. The MRO Supervisor said they did not receive information about the change in instructions for the torque value test not to be performed. The MRO Supervisor assumed engineering would have captured the torque readings. The MRO Supervisor received a call from SAFE the next day regarding the tampering of the coupler. The MRO Supervisor gathered information and sent it to their management and did not provide Safety an update that personnel did conduct a torque value test. The MRO Supervisor later stated in the interview; they did not know the mechanics conducted torque value checks until after communicating with the Mechanics the next day. The MRO Supervisor did not know CENV left before the torque values were taken. The MRO Supervisor noted the Mechanic initially stated they did not take a torque value and then indicated that they did perform the checks later on.

Assistant General Superintendent

The Assistant General Superintendent is a WMATA employee with three years of experience as an Assistant General Superintendent and 37 years of service in various positions, Superintendent, Assistant Superintendent, Supervisor.

The Assistant General Superintendent stated the following associated with the chain of custody event on October 9, 2020.

The Assistant General Superintendent (AGS)

The incident consist arrived, and CMNT, SAFE, and CENV conducted a visual inspection of the coupler. The Chief Mechanical Officer instructed the AGS to conduct a value check of the collar bolt on the front coupler. The AGS passed this information over to CENV. The AGS noted they consulted with CENV, and they decided to call the Chief Mechanical Officer back to devise a plan to not perform the torque value check without the spring pack installed in the buffer tube. The

AGS further advised CENV the test should be performed in a controlled environment. The AGS noted that the DC of CENV gathered CMNT mechanics to conduct the torque value checks before this discussion occurred. Two mechanics showed up to the coupler to perform the torque value test.

The AGS spoke with CENV and SAFE to discuss performing torque value test was not the best practice to achieve accurate readings and should be performed in a controlled environment. CENV called the Chief Mechanical Officer, and they decided to remove the coupler, transport the coupler to Greenbelt, and perform a torque value check.

The AGS said the two mechanics were not in the inspection office during the conversation not to perform torque value testing but to remove the coupler and transport it to Greenbelt for testing the next morning.

The CMNT Assistant Superintendent

The CMNT Assistant Superintendent is a WMATA employee with two years of experience as an Assistant Superintendent and 34 years of service. The Assistant Superintendent held various positions such as inspection office Supervisor and technician positions.

The CMNT Assistant Superintendent stated the following associated with the chain of custody event on October 9, 2020.

When the trains arrived in the shop and were placed into position SAFE and CENV went to look at the train to determine the course of action. CENV requested personnel assistance to check the torque. The Assistant Superintendent made arrangements with the MRO Supervisor for the mechanics to perform that task. Note: First-and only-time having interaction with the Mechanics. The Assistant Superintendent noted the mechanics went onto the floor with CENV. The Assistant Superintendent stated CENV came back into the office and said, "that was not going to work." CENV placed a call to the Chief Mechanical Officer and asked, if could I get the coupler removed. I made arrangements via phone with the MRO Supervisor to get mechanics to remove the coupler. After that, the coupler was removed, banded, and tagged. After that, the Midnight Shift Supervisor transported the coupler to Greenbelt MRO Shop.

During the interview questioning, the Assistant Superintendent noted, they did not recall a mechanic come back into the office to ascertain if CENV was performing the torque value test. The Assistant Superintendent did not receive notification from the MRO Supervisor or mechanics noting the torque value test was performed. The Assistant Superintendent did not recall overhearing a conversation regarding wrapping the front coupler to protect the investigation's integrity. The Assistant Superintendent stated after SAFE and CENV decided the torque value test would not be performed, no further instructions were given to perform a torque value check after SAFE and CENV left the premises. Note: The Assistant Superintendent did not recall time frames.

Deputy Chief CENV

The Deputy Chief of CENV is a WMATA employee with three years of experience as a Deputy Chief of CENV and five years of service. The Deputy Chief of CENV's previous position was a manager of CTEM.

The Assistant Superintendent stated the following associated with the chain of custody event on October 9, 2020.

The DC arrived on location before the incident rail cars arrived at Brentwood Yard. During this time, the Deputy Chief had preliminary conversations with SAFE and CMNT to discuss the situation. Based on a similar incident in 2018, it was to perform a secondary inspection of the couplers upon arrival and remove them and transport them to Greenbelt MRO Shop for a controlled inspection. The Chief Mechanical Officer stated that based on the question, they wanted to perform a torque value check with the coupler still on the car due to questions asked from upper management.

CMNT provided personnel to conduct the test. The DC explained to the mechanics CENV wanted to perform a torque value test starting at 200 and work their way up until the bolt did not move any longer. Note: The DC noted their Supervisor was present during that conversation; the mechanics went to gather tools and the DC went back to the floor. Once the DC went back to the floor, the DC informed the plan's personnel to conduct testing on the car. After speaking with personnel on the floor, the DC then noted that the buffer tube and spring pack's current state would not achieve the proper torque value.

The DC agreed with that logic and went into the inspection office to contact the CMO.

Note: Before the DC went into the Inspection Office to call the Chief Mechanical Officer, the DC said the mechanics came back to the train with the proper tools to perform the test, and the DC instructed the mechanics to hold off things might change.

The DC stated they were in the inspection office for approximately 20 minutes via phone with the Chief Mechanical Officer communicating that the test needed to be performed in a controlled environment. The Chief Mechanical Officer agreed and further discussed the plan to remove the coupler, transport, and schedule time for Greenbelt MRO Shop testing. The DC mentioned that after the decision was finalized, DC started to go back to the floor to notify personnel and thank them for their help. The Assistant Superintendent then stated, "you don't have to do that; I will let them know."

The Mechanic AA

The Mechanic AA is a WMATA employee with one year of experience as an AA Mechanic and 14 years of service. The AA Mechanic has held various positions such as Mechanic A, Mechanic B, Mechanic C, and Mechanic Helper.

The Mechanic AA stated the following associated with the 6000 Series Preventative Maintenance Inspection procedure.

The Mechanic AA noted attending various training classes for 1000 Series cars up to 6000 Series cars spread out over time. The training included friction brake, doors, and truck and suspension training.

The Mechanic AA noted the coupler inspection calls for an inspection of the buffer tube, i.e., check the indicator, buffer tube, bushings on the coupler, hook, guide pins. The Mechanic AA noted they had performed an under-car inspection on several occasions. The Mechanic AA said there are no failure criteria for the coupler gland nut thread checks, only pins, coupler hook, and shear bolts. The Mechanic AA noted in OJT they were shown to move the coupler up and down by the horn to feel if the gland nut is loose. Note: This process is not within the written procedure. However, it does indicate a loose gland nut. The Mechanic AA noted no written instructions within the process detailing gland nut threads inspection nor taught during OJT. The Mechanic AA stated there is no procedure in the under-car inspection manual detailing the flange collar bolt inspection;

however, the under-car inspection manual does state inspect the hardware. The Mechanic AA recalled seeing hardware before with torque stripe applied but only hand tight.

The following three mechanics were involved in the coupler (asset number: 397023) rebuild on October 22, 2019, from Car 6075, which was associated with the pull apart.

The MRO Coupler Shop CMNT Mechanic B (Rebuilt Mechanic)

The MRO Coupler Shop CMNT Mechanic B is a WMATA employee with six months of experience as an MRO Coupler CMNT Mechanic B and eight years of service in various positions, D Mechanic and C Mechanic.

The MRO Coupler Shop CMNT Mechanic B stated the following associated with the Pull-Apart event on October 9, 2020.

During the rebuild process, the MRO Coupler Shop CMNT Mechanic B noted they disassemble the coupler, clean the interior components, inspected and measure the parts. The inspection consisted of the gland nut, threads, buffer tube, and remove the do not re-use parts and start the rebuild process per MSI procedures. During the torquing applications, the MRO Supervisor inspects the process. Note: The MRO Coupler Shop CMNT Mechanic B did not recall the MRO Supervisor recording torquing data during the inspection process. The MRO Coupler Shop CMNT Mechanic B noted no lubrication is applied to the flange/buffer collar bolt before installation. The MRO Coupler Shop CMNT Mechanic B stated this is a dry torque application.

The MRO Coupler Shop CMNT Mechanic B stated the MSI procedures were available. The MRO Coupler Shop CMNT Mechanic B would print off the most recent procedure before conducting an overhaul. The tools used for the rebuild process were provided. The MRO Coupler Shop CMNT Mechanic B did not recall observing the tools to verify the calibration date, but CMNT has a program overseeing all provided tools and equipment are calibrated. When threads are identified damaged on a buffer tube due to an inspection, the machine shop rethreads the affected part. The Leadman acquired all parts for the rebuild process, and, based on this interview, this MRO shop mechanic did not verify if the correct hardware was provided before installation.

The MRO Coupler Shop CMNT Mechanic B (Rebuild Mechanic)

The MRO Coupler Shop CMNT Mechanic B is a WMATA employee with six months of experience as an MRO Coupler CMNT B Mechanic and seven years of service in various positions, Mechanic D and Mechanic C.

The MRO Coupler Shop CMNT Mechanic B expressed the MRO Supervisor did not know the process, did not know which parts were required for the rebuild and the Leadman was more informative and knowledgeable of our jobs and responsibilities. The MRO Coupler Shop CMNT Mechanic B noted they were partnered with an experienced mechanic to learn the rebuild process, and the MRO Coupler Shop CMNT Mechanic B did not recall signing an OJT form for coupler rebuild training. The MRO Coupler Shop CMNT Mechanic B stated that they were eventually provided a procedure after CENV reviewed our rebuild process in 2018.

The MRO Coupler Shop CMNT Mechanic B stated that when the Leadman provided parts for rebuilding a coupler, they reviewed the parts to ensure they are correct. When a part is identified as defective, they will notify the Leadman to perform an inspection. The MRO Coupler Shop CMNT Mechanic B was instructed to find a bolt that matches the same size. During the torquing process of the flange/buffer collar bolt, the MRO supervisor observes the process. The MRO Coupler Shop CMNT Mechanic B did not recall if the flange/buffer bolts required lubrication.

The MRO Coupler Shop CMNT Mechanic B (Rebuild Mechanic)

The MRO Coupler Shop CMNT Mechanic B is a WMATA employee with one year of experience as an MRO Coupler CMNT B Mechanic and eight years of service in various positions, Mechanic D and Mechanic C.

During the rebuild process, the MRO Coupler Shop CMNT Mechanic B noted they disassemble the coupler, order parts from the Leadman, assemble the coupler per maintenance manual. The MRO Supervisor would then come and inspect the torquing process of the flange/buffer collar. The flange/buffer collar bolt would be installed by hand with anti-seize lubrication applied on the bolt threads, then apply mechanical forces to achieve the appropriate torque value. CENV came to the MRO, reviewing the rebuild process to provide a better manual.

The MRO Coupler Shop CMNT Mechanic B verified the torque wrenches used during install are within specifications. The torque values are not documented within the Maximo work-orders. The MRO Coupler Shop CMNT Mechanic B verifies the coupler hardware is new but does not verify the parts upon arrival. The MRO Coupler Shop CMNT Mechanic B did not recall identifying an incorrect bolt provided by the Leadman. The MRO Coupler Shop CMNT Mechanic B noted the work environment was comfortable and they were not rushed during the rebuild process to complete couplers. The MRO Coupler Shop CMNT Mechanic B pointed out they use air tools to disassemble the coupler but not during the rebuild.