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WMSC Commissioner Brief: W-0092 – Improper Roadway Worker Protection – Between Columbia Heights and Georgia Ave.-Petworth stations – January 22, 2021

Prepared for Washington Metrorail Safety Commission meeting on August 3, 2021

Safety event summary:

A roadway maintenance machine, Prime Mover 61, moved into a work zone between Columbia Heights and Georgia Ave.-Petworth stations with the permission of a Rail Operations Control Center (ROCC) controller, leading to a near-miss of a collision with a worker who was on the roadway without having clearly communicated with the ROCC.

As Metrorail ended revenue service for the night on January 21, 2021 into January 22, 2021, ROCC controllers permitted an Automatic Train Control (ATC) crew to begin work at the Braddock Road Station Interlocking. This work led to the ROCC not having control of that interlocking or confirmation of the position of the switches in that interlocking, which significantly delayed vehicle movements required to return trains to rail yards and to get other work crews out to their assigned locations and contributed to personnel feeling rushed to get work zones established and units to their required locations. Work crews were additionally delayed by Track Geometry Vehicle (TGV) operations.

Just before this event, ROCC management switched the Button Controller and Radio Controller due to concerns that the Button Controller, who had only recently been certified, was not able to handle the ongoing workload. (On the overnight, or Owl, shift, there is typically a heavier workload on the button controller than the radio controller.) Both prior to and after the switch, there appears to have been inadequate information sharing and communication between these partners.

At 1:55 a.m. on January 22, just after third rail power was de-energized in a work area that stretched from Columbia Heights Station toward Georgia Ave.-Petworth Station, an employee functioning as a Roadway Worker In-Charge (RWIC) for Track and Structures insulator cleaning work requested and received permission to place shunts that would mark the ends of the protected work area. (Shunts electrically connect the two running rails so that Metrorail's train control systems indicate that the area is occupied, providing a level of protection against some types of collisions.) This was done in a single request and approval for both ends of the work zone, rather than separate Foul Time protection requests as specified in Metrorail procedures; however, the RWIC then did relinquish Foul Time and requested and received permission to use Prime Mover 45 to set up other parts of the work zone. At 2:13 a.m., the RWIC installed a shunt at Columbia Heights Station. Approximately 25 seconds later, the ROCC controllers set a route allowing Prime Mover 61 to cross from Track 2 to Track 1 into the work zone. At 2:17 a.m., the ROCC gave the operator of Prime Mover 61 permission to move through the work zone toward Fort Totten Station. The more experienced controller, now operating as the button controller, stated in an interview that it was acceptable to move Prime Mover 61 through the interlocking because the RWIC's prime mover was holding at a red signal, and therefore the work zone had not yet been fully established. The controller indicated in an interview that there is no clear direction on when the RWIC gets full control and authority over a work location.

The RWIC was continuing to set up the north end of the work zone in and along the interlocking between Columbia Heights and Georgia Ave.-Petworth stations where the ROCC had given Prime Mover 61 permission to cross over. The RWIC had boarded a prime mover to reach the interlocking, stopped at a red signal at the interlocking to put an "End

Work Zone" mat down to save time, then walked toward the north end of the interlocking to place the shunt that would provide a level of protection at that end of the work zone. While the RWIC was on the roadway, with protections noted in the Advanced Information Management (AIM) system used by the ROCC, Prime Mover 61 approached the area. The RWIC heard the unit coming and stayed out of the way, avoiding injury or death. The ROCC was not specifically aware that the RWIC was walking on the roadway or of the RWIC's precise location. The RWIC estimated the vehicle came within 200 feet of the RWIC's location.

The personnel on the prime mover did not identify this safety event, and continued to their destination at Fort Totten Station. The RWIC for the work location between Columbia Heights and Georgia Ave.-Petworth stations then called ROCC on the phone but was put on hold twice. When the ROCC answered a third call, the RWIC informed the Button Controller that a work unit had been crossed into the work zone. The controller transferred the call to the ROCC Assistant Superintendent. The RWIC stated that they had stopped the prime mover they were using to set up the work zone at the red signal at the Columbia Heights end of the interlocking so that they did not have to clamp switches, which they felt was not necessary since Track 1 past the interlocking was in their work area. As the RWIC was walking the remainder of the way to the Georgia Ave.-Petworth Station to place the second shunt, the RWIC heard Prime Mover 61 move into the area.

Metrorail did not remove the RWIC for post-incident drug and alcohol testing as required by WMATA policy. SAFE notified TRST on January 23 at 3:07 p.m. that the RWIC should have been tested. TRST removed the RWIC from service on January 24 at 11 p.m., however this was after the testing time period for the event had elapsed. The ROCC controllers were removed from service for post-incident testing.

The investigation identified that work crews and ROCC personnel are not following Roadway Worker Protection (RWP) procedures, including Standard Operating Procedure (SOP) 28. Metrorail procedures require Foul Time protection to be requested for each part of the process of setting up a work zone, with fixed work zone procedures applying only after the work zone is properly set up. Instead, Metrorail personnel are acting with blanket requests that do not clearly identify the locations of or protections for personnel until the work zone is established. This creates uncertainty about who is responsible for vehicle movement and other factors between the time of the initial request and the time that the work zone setup is completed. Even Metrorail management was not clear as to when a scheduled work location becomes the RWIC's responsibility rather than the ROCC's responsibility.

The investigation also identified similar safety issues and lack of communications related to the use of prime movers to set up work locations, a lack of comprehensive procedures for such a process, and a consistent use in this case outside of requirements that prime movers be used only with an absolute block to provide protections against collisions.

Metrorail's written procedure, in Appendix B, also does not provide for uniform protections that ensure the use of shunts and personal protective equipment (PPE) by all departments.

Metrorail's extensive practical drift away from approved safety procedures and checklists undermines the effectiveness of these safety procedures that were created to significantly mitigate the risk of collision, injury or death.

Probable Cause:

The probable cause of this near-miss of a collision was Metrorail's lack of safety assurance and supervisory oversight to ensure that safety-critical procedures are followed rather than allowing for continuing practical drift from approved safety procedures by personnel in the field and in the Rail Operations Control Center. Contributing to this event was the complexity of and practical information missing from Metrorail's roadway worker protection procedures, inadequate safety promotion in relation to those procedures, inadequate responses to and communication regarding frontline employee safety concerns, the training and certification process for rail traffic controllers, and ROCC management switching controller assignments without ensuring clear and complete communication. Also contributing to this event was inadequate work planning, scheduling and coordination to ensure that crews began work in the proper order to maximize work time and reduce the risk that crews would be pressured to rush through safety duties.

Corrective Actions:

The ROCC developed a lessons learned document related to SOP 28 and Exclusive Track Occupancy (ETO) procedures focused on when a RWIC controls a work location, what Foul Time requests are required, and when the ROCC can allow units to move in or around a work area.

Metrorail also distributed a memorandum specifying procedures for work zone setup and emphasizing the transfer of work location control from the ROCC to the RWIC.

WMATA is in the process of a roadway worker protection rules overhaul, including changes to forms of protection and process related to this event to eliminate this foul time requirement in place of a single grant of authority to establish the work zone.

WMSC staff observations:

Elements of ROCC controller training, certification and staffing are under review or improvement through a number of open corrective action plans (CAPs) related to WMSC findings, including findings from the ROCC Audit issued in September 2020.

Metrorail is also conducting a broad review of the Metrorail Safety Rules and Procedures Handbook, which is currently more than 700 pages.

In addition to the issues noted above, the RWIC did not request and ROCC did not institute prohibit exits on the signals in an interlocking within a work area, which would have provided another redundant form of protection against this improper movement into a work zone.

Metrorail risks more negative consequences if communications regarding safety issues are not handled in a timely manner whether via radio or phone calls.

Staff recommendation: Adopt final report.

Washington Metro Area Transit Authority

Department of Safety and Environmental

Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E21025

Date of Event:	01/22/2020
Type of Event:	Improper Roadway Worker Protection (RWP)
Incident Time:	02:18 hours.
Location:	Between Columbia Heights and Georgia Ave-Petworth
Time and How received by SAFE:	02:42 hours. – SAFE On-Call Phone.
WMSC Notification Time:	04:38 hours.
Rail Vehicle:	Prime Mover 61
Injuries:	No
Damage:	No
SMS I/A Incident Number:	SMS 20210122#91500

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Abbreviations and Acronyms

AIMS	Advanced Information Management System
ARS	Audio Recording System
ATC	Automatic Train Control
CM	Chain Marker
ETO	Exclusive Track Occupancy
GOTRS	General Orders and Track Rights System
GV01	Geometry Vehicle
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic and Atmospheric Administration
OJT	On-the-Job Training
PPE	Personal Protective Equipment
RJSB	Roadway Job Safety Briefing
ROCC	Rail Operations Control Center
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
RWIC	Roadway Worker in Charge
RWP	Roadway Worker Protection
TRST	Office of Track and Structures
SAFE	Department of Safety and Environmental Management
SMS I/A	Safety Measurement System Incidents/Accidents
SOP	Standard Operating Procedure
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

On Friday, January 22, 2021, at 02:26 hours, the Office of Track and Structures (TRST) Supervisor, Roadway Worker in Charge (RWIC) setting up their work location for insulator cleaning between Chain Marker (CM) E1-129+30 Columbia Heights Station and CM E1-175+36 Georgia Ave-Petworth Station, notified the Rail Operation Control Center (ROCC) Buttons Rail Traffic Controller (RTC) via phone that ROCC moved a unit through their work location.

Based on Audio Recording System (ARS) Playback, at 1:55:18 hours., the RWIC confirmed third rail power was de-energized in their work location at E1-135+00, E1-169+00 and E1-170+00. The RWIC then requested permission to place shunts at the Columbia Heights Station to establish one end of the protected area at CM E1-129+30. At 1:55:37 hours. ROCC authorized the RWIC to place shunts and verify per Standard Operating Procedure (SOP) Protection for Roadway Workers and Establishment of Third Rail Power Outages and Work Areas on the Roadway.

The ARS and Advanced Information Management System (AIMS) playback confirmed at 02:13:44 hours, the RWIC installed a shunt at Columbia Heights Station. The Radio RTC confirmed the AIMS screen displayed shunt placement at Columbia Heights Station. At 02:13:54 hours. The Equipment Operator (E/O) of PM 61 notified the ROCC Radio RTC they were clear of the E05-06 signal. At 02:14:08 hours, the Buttons RTC set a route for unit PM61 to crossover at Georgia Ave-Petworth, interlocking from Track #2 to Track #1. Note: PM 61 was not a part of this work crew. At 02:17:39 hours, the Radio RTC gave PM61 an absolute block crossing over from Track #2 to Track #1 to Fort Totten Station into an unoccupied work location [E1-129+30 to E1-175+36]. At 02:18:04 hours, the AIMS playback revealed, the RWIC stopped PM45 at E05-02 signal CM E1-166+00 displaying a red aspect.

At 02:26 hours, ARS phone playback revealed, the RWIC stated, “they did not want to clamp the interlocking because E1-170+00 was their protected area”. The RWIC then said they disembarked PM45 and walked towards E1-175+36 to place their shunts. The RWIC said they heard a unit approaching and got on the catwalk. The RWIC reported they were not in front of the unit at the time PM61 traversed the area. No injuries or damage were reported for this event.

The Rail Operations Control Center (ROCC) removed the RTCs from service for post-incident toxicology testing per RTRA’s Standard Operating Procedure (SOP 102-1 Removing an Employee from Service). On January 23, 2021 at 1507 hours, the Department of Safety and Environmental Management (SAFE), shared findings with TRST that an Improper RWP met the testing criteria for post-incident testing. TRST removed the RWIC from service on January 24, 2021 at 2300 hours for the post-incident testing; however, WMATA did not test the TRST employee since the 32-hour testing parameters had been exceeded.

Following a review of the system of records and analysis of data recording systems, SAFE determined the RWIC did not request Foul Time (FT) to re-enter the roadway to set up the other end of their protected area of the work location at E1-175+36 per Metrorail Safety Rules and Procedures Handbook (MSRPH) 5.13.7 Exclusive Track Occupancy (ETO).

The probable cause of the Improper RWP on January 22, 2021, at Georgia Ave-Petworth Interlocking was a deviation from established rules and procedures, a lack of communication, an inexperienced RTC, and common departmental practices not outlined in the MSRPH which caused practical drift between the respective departments. Specifically, the ROCC automatically grants work crews FT to start work on Supervisory and Red Tag Outages and does not require RWICs to request FT while disembarking their prime mover while setting up their work location.

The RWIC and the RTC failed to adhere to MSRPH 5.13.7 ETO and SOP 28. The RWIC involved in this incident did not request FT to enter the roadway. ROCC was unaware that TRST RWIC disembarked PM45 and had entered the roadway to complete setting up their protected area. Consequently, ROCC authorized the movement of PM61 from Track #2 to Track #1 towards Fort Totten Station.

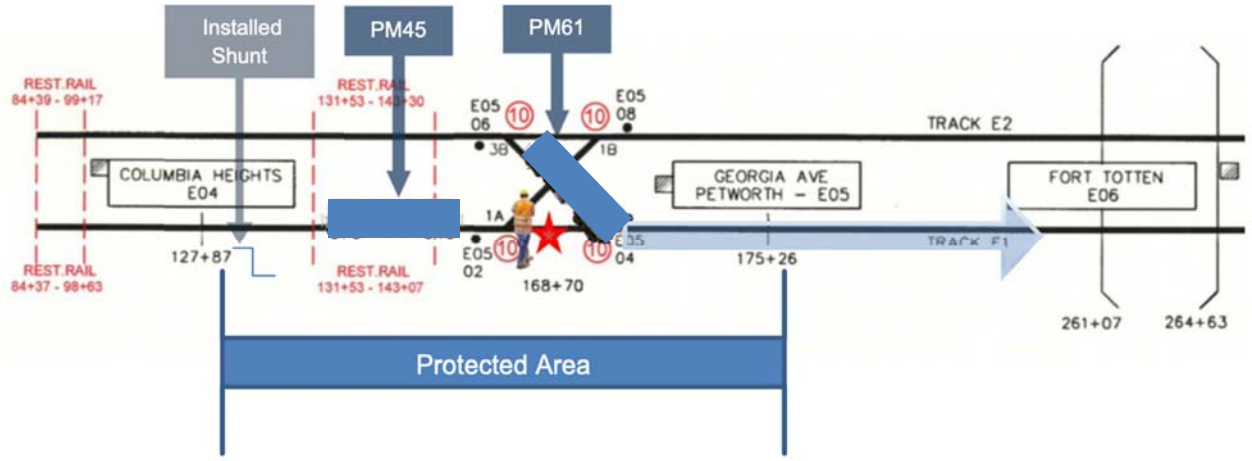
Contributing to this event, the Button's RTC allowed ATC to access a room at Braddock Road Station to de-energize the interlocking, which caused the switch to go out of correspondence. This action created a delay for non-revenue trains to enter the yard and tandem delays for work crews scheduled to reach their working locations. Further contributing to the incident, ROCC management switched the Radio and Button RTC in the middle of the fieldwork crew transition. Additionally, the MSRPH does not have language within MSRPH explaining utilizing a unit to set up a work location during a Red Tag or Supervisory Outage and when the RWIC control of an area begins.

Incident Site

Between Columbia Heights and Georgia Avenue Stations, Track #1

Protected Area: E1-129+30 through E1-175+36
Working Limits: E1-134+30 through E1-170+36

Field Sketch/Schematics



Purpose and Scope

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

Investigation Process and Methods

Upon receiving the Improper RWP notification, Track #1, on January 22, 2021, SAFE conducted a cross-functional investigation into the incident. SAFE team members worked with relevant WMATA subject matter experts to review the incident's facts and data.

Investigative Methods

The investigative methodologies included the following:

- Formal Interviews: SAFE interviewed two individuals:
  - RWIC
  - Buttons RTC

- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
  - Metrorail Safety Rules and Procedures Handbook (MSRPH)
  - General Order and Track Right Authorization System (GOTRS)
  - National Oceanic and Atmospheric Administration (NOAA)
  - Safety Measurement System (SMS) Incidents/Accidents

- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information.

- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
  - Audio Recording System (ARS) playback [Radio and Phone Communications]
  - Advanced Information Management System (AIMS)

Investigation

Prior to this event, ROCC RTC granted ATC permission to enter the Braddock Road Station interlocking to remove power from the interlocking to perform work. Braddock Road Interlocking went out of correspondence and caused a significant delay for non-revenue trains to exit the railroad and tardy work crews' arrivals to their work locations. PM 61 was late to their work location and needed to cross over from Track #2 to Track #1 in Fort Totten Station's direction.

Based on ARS Playback, at 1:55:18 hours., the RWIC operating on Track #2 confirmed third rail power was de-energized in their work location at E1-135+00, E1-169+00, and E1-170+00. The RWIC then requested permission to place shunts at the Columbia Heights Station to establish one end of the protected area at CM E1-129+30. At 1:55:37 hours. ROCC authorized the RWIC to place shunts and verify per SOP 28.

The ARS and Advanced Information Management System (AIMS) playback confirmed at 02:13:44 hours, the RWIC installed a shunt at a Columbia Heights Station. The Radio RTC confirmed the AIMS screen displayed shunt placement at Columbia Heights Station. At 02:13:54 hours., the E/O of PM 61 notified the ROCC Radio RTC they were clear of the E05-06 signal. At 02:14:08 hours, the Buttons RTC set a route for unit PM61 to crossover at Georgia Ave-Petworth, interlocking from Track #2 to Track #1. At 02:17:39 hours, the Radio RTC gave unit PM61 an absolute block crossing over from Track #2 to Track #1 to Fort Totten Station into an unoccupied work location [E1-129+30 to E1-175+36].

At 02:18:04 hours, the AIMS playback revealed, the RWIC stopped PM45 at E05-02 signal CM E1-166+00 displaying a red aspect. At 02:26 hours, ARS phone playback revealed, the RWIC stated, “they did not want to clamp the interlocking because E1-170+00 was their protected area”. The RWIC then said they disembarked PM 45 and walked towards E1-175+36 to place their shunts. The RWIC said they heard a unit approaching and got on the catwalk. The RWIC reported they were not in front of the unit at the time PM61 traversed the area. No injuries or damage were reported for this event.

RTRA removed both RTCs from service for post-incident toxicology testing per RTRA’s SOP 102-1 Removing an Employee from Service. After collecting and reviewing the facts, TRST was alerted the RWIC met the testing criteria for post-incident testing for an Improper RWP on January 23, 2021 at 1507 hours. On January 24, 2021 at 2300 hours, TRST removed the RWIC from service and sent for the post-incident testing; however, the employee was not tested since the 32-hour testing parameters had been exceeded.

Chronological Timeline of Events

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

Time	Description
01:55:12 hrs.	RWIC: Central 697 [Radio]
01:55:18 hrs.	Radio RTC: 697 go with your transmission over [Radio] RWIC: At this time, third rail power is de-energized in my work location, Echo 1 135+00 169+00 and 170+00. How do you copy? Radio RTC: Echo 1 135+00 169+00 170+00? RWIC: That’s affirmed central
01:55:37 hrs.	Radio RTC: That’s a good copy; you have permission to place your shunts according to SOP and contact central to verify over. [Radio]
01:55:55 hrs.	RWIC: Affirm place shunts confirm [unintelligible audio]. Radio RTC: Affirm Centrals out. [Radio]
01:59:24 hrs.	RWIC: Central control; what time did I relinquish that FT? [Radio]
01:59:31 hrs.	RWIC: I want to relinquish that FT to use the unit (PM45) to set up the rest of this work area. [Radio]
01:59:39 hrs.	Radio RTC: Roger good copy, 697 you want to relinquish your FT at 1:59:39 hrs. You have permission to use your unit (PM45) to set up your work location over. [Radio]
01:59:45 hrs.	RWIC: Affirm I relinquished FT; I can use the unit to set up my work location. Radio RTC: Affirm Centrals out. [Radio]
02:08:25 hrs.	Buttons RTC: PM 61 absolute as you clear Echo Zero Five - 26 Georgia Avenue, we are going to cross you over from two to one once you clear 06 at Georgia Ave over. PM61: Clear Georgia Ave, then we going to cross over verifying all Buttons RTC: That is a good copy central’s out [Radio]
02:12:46 hrs.	PM61: “PM61 clear at Georgia Ave Zero Six.” [Radio]
02:13:24 hrs.	RWIC: Central Control, how do you copy that first shunt in my work location? [Radio]
02:13:31 hrs.	Radio RTC: Copy one shunt 697 over. RWIC: Confirm standby for the second shunt. Radio RTC: That’s a good copy 697 central’s out [Radio]

02:13:44 hrs.	*AIMS Playback displayed PM45 at Columbia Heights Station with Shunt deployed*
02:13:54 hrs.	PM61: PM61 clear at Georgia Ave zero 06. [Radio]
02:14:08 hrs.	*AIMS playback displayed a flashing lunar at E05-06 Signal after Buttons RTC set a reverse move from Track #2 to Track #1.*
02:17:39 hrs.	Radio RTC: PM61 verify personnel and equipment are clear to move, verify lunar Echo zero five crossing over from Track #2 to Track #1 absolute block Fort Totten Station, Track #1. PM61: PM61 copy that lunar crossing over two to one absolute block work location Fort Totten Station, Track #1 verifying all PM 61. Radio RTC: That's a good Copy 61 central out. Flag Person on PM 61: Proceed 61, got flashing lunar turnout Fort Totten. [Radio]
02:18:04 hrs.	*AIMS playback displayed third rail power de-energized on Track #1 Columbia Heights Station to Georgia Ave-Petworth Interlocking. Note: Third rail power was de-energized at this work location at approximately 01:54 hrs.*
02:18:40 hrs.	*AIMS playback displayed PM61 occupied E05 interlocking crossing over from Track #2 to Track #1.*
02:19:04 hrs.	*AIMS playback displayed PM61 occupied Track #1.*
02:22:32 hrs.	*AIMS playback displayed PM61 approaching a blue block location.*
02:23:32 hrs.	*AIMS playback displayed PM61 arrived at Fort Totten Station platform.*
02:24:28 hrs.	PM61: Central 61 on work location Fort Totten Track #1 Radio RTC: PM61 on location Fort Totten Track #1 central's out [Radio]
02:24:56 hrs.	RWIC: Central control 697. [Radio] Note: ROCC did not respond
_	The RWIC made a couple calls and was put on hold during this time frame. On the last call the RWIC stated, don't put me on hold and iterated the below statement.
02:26:00 hrs.	The RWIC contacted the Buttons RTC via phone and stated, "Hey Central, this is 697 down at Echo Zero Five; you all crossed a unit over in my work area." Buttons RTC: "No, we didn't." RWIC: "Yes, you did! I am walking, setting my shunts up at 175+00 at the interlocking. I'm not clamping the interlocking; I'm Echo at 70." Buttons RTC: "Hold on." Buttons RTC transferred the call to the ROCC Assistant Superintendent. RWIC: You all crossed a unit over in my work area. I stopped my unit; I got to set my shunts at 175+00 at the platform at Georgia Ave, correct. I am sitting here at E1-172+00 now before I go into the platform. I stopped my unit at 166+00., got off the unit, and started walking because I did not want to clamp the interlocking because I have E1-170+00 as my protected area, and you all just crossed a unit over in my work area. Good thing I was not in front of it. I want to make nothing else is coming through here. ROCC Assistant Superintendent: Requested name and number to report the incident to superiors and instructed the RWIC to stand by. [Phone]

Advanced Information Management System Playback

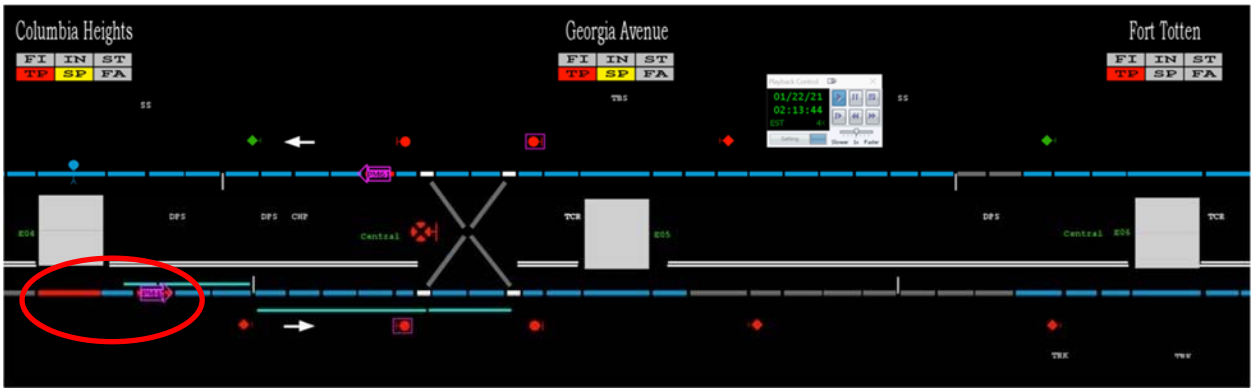


Figure 1: AIMS Playback displayed PM45 at Columbia Heights Station with shunt deployed.

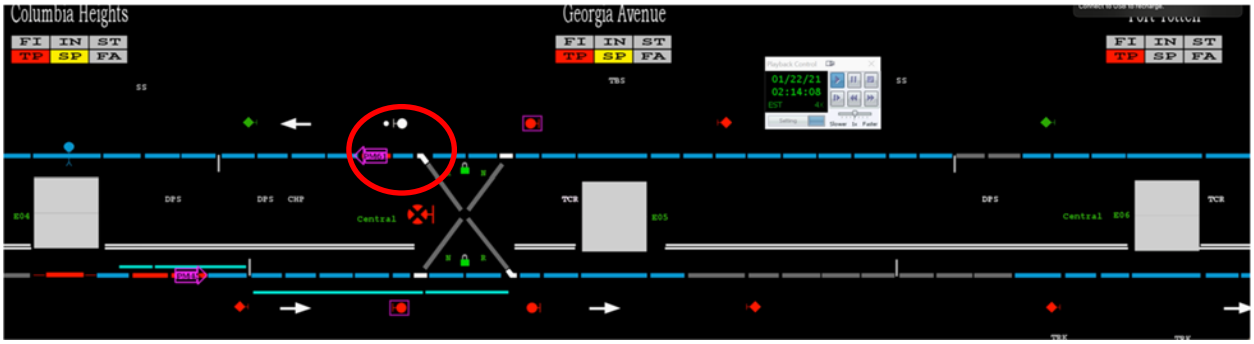


Figure 2: Buttons RTC sent a reverse move from Track #2 to Track #1; flashing lunar displayed on the AIMS Screen.

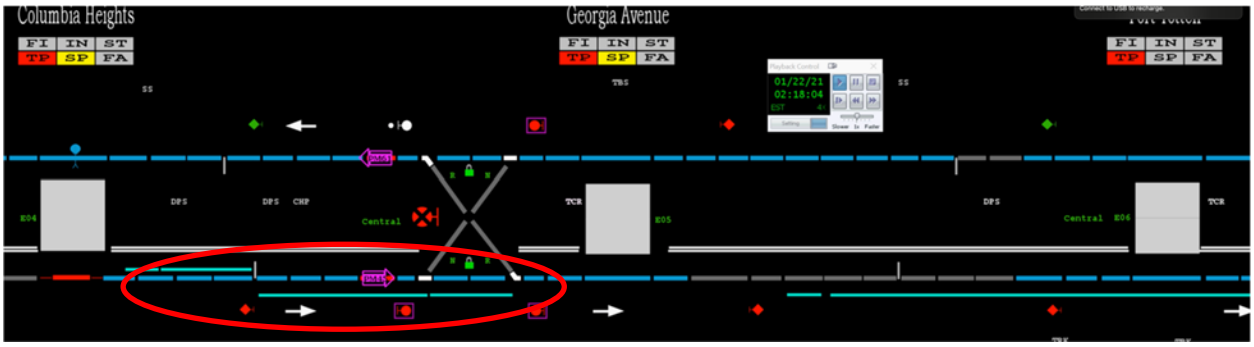


Figure 3: AIMS playback displayed third rail power de-energized on Track #1 Columbia Heights station up to the end of Georgia Ave-Petworth Interlocking Note: Third Rail Power was de-energized at approximately 01:54 hours.

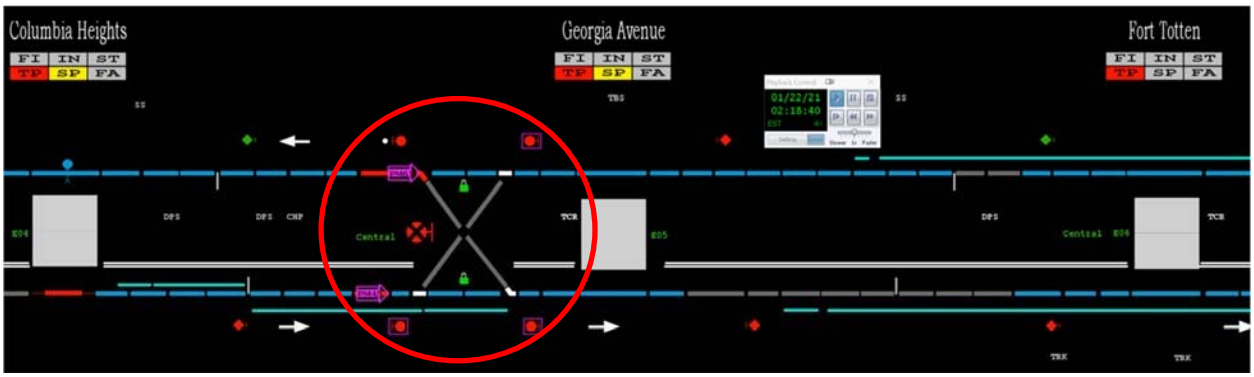


Figure 4: AIMS playback displayed PM61 occupied E05 interlocking crossing over from Track #2 to Track #1 with PM 45 holding at Red Signal.

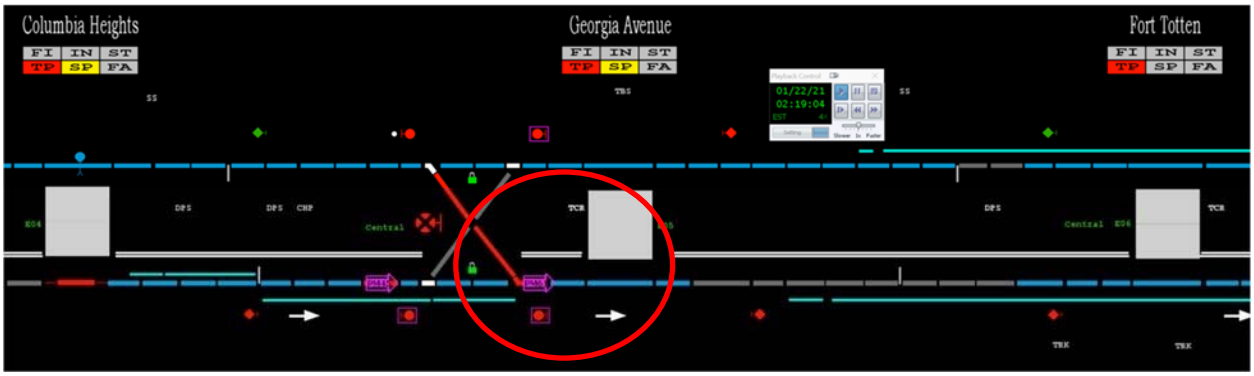


Figure 5: AIMS playback displayed PM61 occupied Track #1 in front of PM45, utilizing the unit to set up their work location.

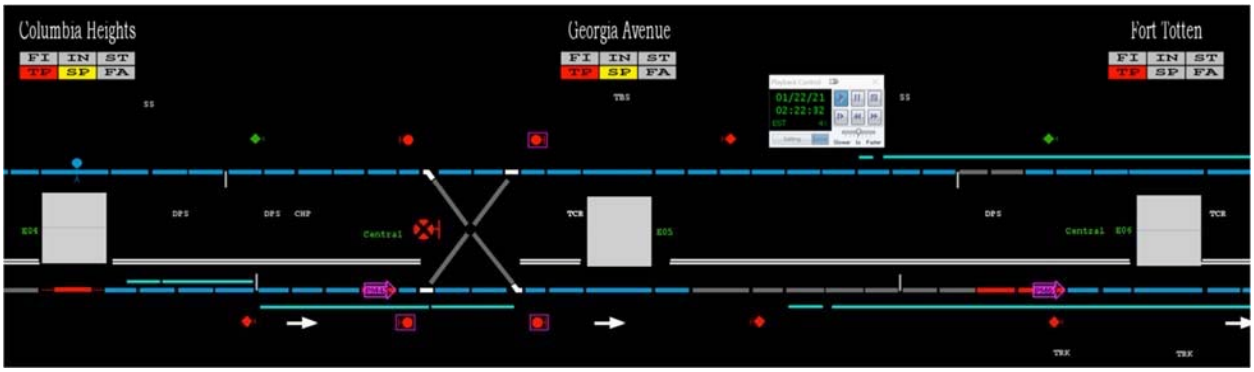


Figure 6: AIMS playback displayed PM61 approaching a blue block location.

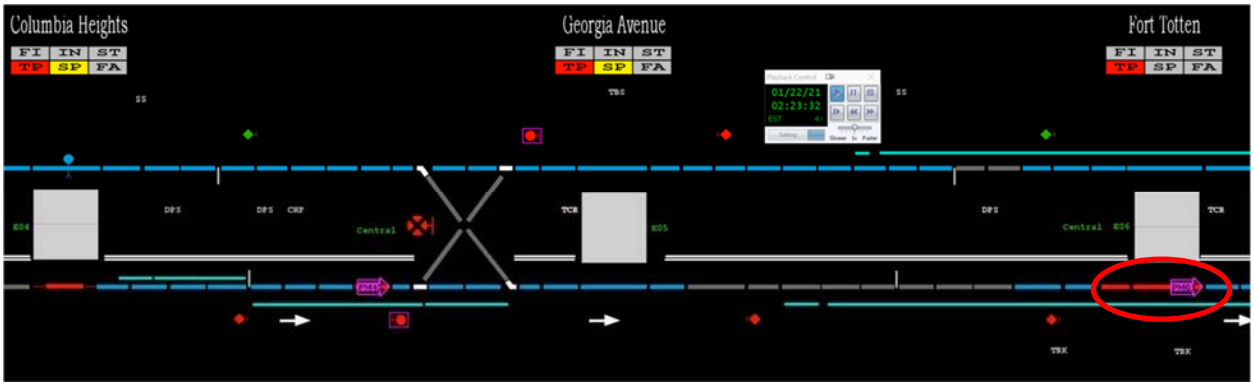


Figure 7: AIMS playback displayed PM61 arrived at Fort Totten Station platform.

Departmental Stakeholders Meeting

TRST, ROCC, and SAFE personnel met to identify recommendations for the Georgia Ave-Petworth improper RWP event. Based on a review of the SOP 28 and Appendix B for ROCC coordination with Roadway Worker In-Charge for Establishment of Work zones, ROCC RTCs are not operating according to the rules and procedures. SAFE identified practical drift specific to the foul time request process that occurs between the field RWIC and ROCC RTC. The drift has allowed for work location ownership uncertainty between the RWIC and ROCC while the location is established.

The MSRPH states ROCC shall not execute nor authorize, movement of switches within the working limits without authorization from the RWIC. This rule applies when the ROCC transfers the work location to the RWIC. When ROCC authorizes the RWIC to set up their work location

using their Unit [Prime Mover] to expedite placement of protective equipment for large work areas, reciprocity within the procedure occurs as a transfer of a work locations control does not apply. In this case, once the RWIC relinquished their FT and boards the Prime Mover, the ROCC RTC removed the prohibits / block calls on the respective signals to authorize a unit to move through the interlocking within TRST's scheduled work location, which is still under ROCC's control. The Radio RTC did not require authorization from the RWIC. The RWIC did not request FT to disembark their unit to continue setting up their work location.

Appendix B states the verification of shunts, drop circuits, drop signals, and PPE is optional for certain departmental groups. The stoppage of train movement is not addressed. The pre-fouling safety briefing sheet prohibits exits, and announcements are required to establish a work zone. A copy of this event briefing form was not provided for this incident.

Common practices are not considered a rule, procedure, or written instruction. According to the findings, ROCC is operating under common practices and internal processes which allows for rule misinterpretations for RTCs and RWICs in the field. ROCC stated that calling for foul time is "tedious and redundant," when foul time is automatically assigned by the ROCC for work crews establishing the work location while calling for a Red Tag or Supervisory Outage. However, based on the MSRPH, it is a violation to move any unit under foul time. This action would not be in compliance with the updated ETO 5.13.7 or SOP 28 rules and procedures.

Interview Findings

Based on the investigation of the Georgia Ave-Petworth Station Improper RWP event, SAFE conducted two virtual interviews via Microsoft Teams, which included the investigation team, relevant Metro management, and the Washington Metrorail Safety Commission (WMSC). These interviews were conducted over one week after the event and identified the following key findings associated with this event, as follows:

According to the Radio RTC, ATC was in the Braddock Road Station room, but they never knew because their partner never told them. When they asked their partner the reason, they said they were taking power from the switches. It took approximately 20 minutes in-turn, which held up the work locations from getting started. The Buttons Controller was new to the position.

At around 01:30 hours, the Buttons Controller and Assistant Superintendent notified that all red tags were issued. Around 01:45 hours, the Radio RTC switched to the Buttons RTC. During this time, the new Buttons RTC was attempting to track what actions the previous Buttons RTC took. They attempted to tell the Radio RTC that the foul time was for the power personnel racking the breakers and hot sticking to verify power was de-energized.

The new Radio RTC gave PM61 permission to cross over from two to one, going to the work location at Fort Totten. The RTC did not think they were in violation because they never knew the RWIC was working. The RTC stated that if they knew the RWIC was working, they would have asked the Buttons RTC to contact the RWIC and request them to standby so the unit could cross into their work location.

According to the RWIC, they briefed their crew, and ROCC called them via radio and stated the breakers were racked in the area. ROCC also communicated that the E02 04 signal was red, the blue block human form was in effect, and the RWIC should hot stick and report a Chain Marker. Prior to that, the RWIC saw a unit come up on track two and then went into the tunnel, but did not pay it any attention.

When the ROCC gave the RWIC permission, they checked the gaps on the south end and placed their shunts according to SOP on the Columbia Heights end. After they put their shunts down and verified the shunt with ROCC, ROCC stated they were standing by for the next shunt location. The RWIC called ROCC via radio and requested to relinquish their FT to move PM 45 to the next shunt location, 5000 feet away. ROCC authorized the use of their unit. ROCC stated "at this time, you relinquished your FT standing by for the second shunt unit". The RWIC used the unit and moved toward the E04-02 signal.

The RWIC stopped E1-166 +00 and determined that the interlocking would not be used. At this time, it was approximately 01:45 hours and the RWIC was scheduled to turn the tag in by 04:00 hours. To save time, the RWIC planned dropped the work at mat E1-166+00 and place the shunt at E1-175+00, which is on the other side of the interlocking. The RWIC dropped their mat and started walking through the interlocking. The RWIC heard ROCC give permission to PM61 to go from Track Two to Track One from E1-170+00. The RWIC stopped at E1-168+00 after hearing an oncoming vehicle, and determined that the ROCC brought a unit over. The unit passed and went to the platform where the RWIC planned to place shunts, at E1-175+00.

The RWIC stopped, called ROCC, and was put on hold. The RWIC hung up and called back, and was put on hold again. When answered, the RWIC informed the ROCC that they had crossed a unit over in their work area at Georgia Ave-Petworth. The ROCC denied the action. The RWIC explained that the ROCC was to move all traffic through the location prior to giving the track rights to set up the protection. The RWIC was asked to stand by and hold. It was too late to perform any work after ROCC contacted the RWIC.

During the interview, the RWIC stated that there is no clear process understanding of utilizing a unit to set up ETO protection in a work area with foul time. The RWIC stated that ETO protection does not have anything about using a unit. The RWIC indicated he was incorrect per the SOP, but the SOP is not followed in their operations every night. The RWIC stated that the SOP was created for walking establishment of work zones, without the use of a unit, and while under foul time protection. The RWIC stated that to utilize a unit, foul time must be relinquished. The SOP states, when you request ETO, you must request foul time, which does not happen according to the RWIC. ROCC automatically gives RWICs foul time to set up protection, even when a unit is used to establish the work area. The RWIC was not instructed to continuously ask for foul time while establishing the interlocking or the other end of the work area via a work unit, after initially relinquishing it to the ROCC.

Findings

- TRST RWIC used FT to enter the roadway to set up their work location at Columbia Heights Station.
- TRST RWIC relinquished their FT afterward and requested permission to utilize their Prime Mover (PM 45) to set up the remaining work location between Columbia Heights and Georgia Ave-Petworth [CM's E1-129+30 through E1-175+36], which ROCC permitted.
- ROCC granted PM 61 permission to crossover from Track #2 Georgia Avenue Interlocking to Track #1, in the direction of Fort Totten Station. This move was in front of PM 45, which

was holding at a red signal; PM 45 was still in the process of establishing their work location.

- TRST RWIC disembarked PM 45, without FT protection, and walked toward Georgia Ave-Petworth to place shunts at E1-175+36. ROCC was not aware TRST RWIC went to the roadway.
- TRST RWIC never re-established FT before disembarking PM 45 and entering the roadway at E1-166+00.
- The TRST RWIC's actions were not in compliance with RWP Rules and Procedures 5.13.7 regarding ETO establishment (noted in Appendix A, attachment 1).
- ROCC RTC did not use the Pre briefing checklist outlined in SOP 28 Appendix B.
- ROCC management switched the Radio RTC to Buttons RTC after the interlocking issue at Braddock Road Station.
- The Radio RTC was a new controller with limited to no experience as a Buttons Controller.
- ROCC is directing RTC's incorrectly on the MSRPH procedures, causing an misinterpretations for the RTC's and RWIC's in the field.
- According to ROCC, the RWIC and ROCC personnel automatically set up FT for Red Tag and Supervisory Outages. The RWICs do not normally continuously request FT while establishing their work location via a prime mover. These activities include interlocking, checking, and confirming third rail power gaps, map, and shunt placement while utilizing their unit as outlined in the MSRPH SOP 28 and ETO 5.13.7 procedures.
- The ROCC management and TRST personnel are unclear on when the scheduled work location is officially the RWIC's.
- The Radio RTC allowed ATC to enter the Braddock Road Station ATC room and de-energize the interlocking before non-revenue trains and work crews could reach their locations. The consequently prevented the ROCC Buttons RTC from setting routes creating extensive non-revenue delays.

Weather

At the time of the incident, NOAA recorded the temperature at 33° F and sunny. SAFE has concluded that weather was not a contributing factor in this incident. (Weather source: NOAA – Location: Washington, DC.)

Human Factors

Fatigue Risk Factors:

RWIC

Risk factors for fatigue were present. The incident time of day did suggest an increased risk of fatigue-related impairment. The employee reported some variation in the sleep schedule in the days leading up to the incident. The employee was awake for 7 hours at the time of the incident. The employee reported 8 hours of sleep in the 24 hours preceding the incident. The off-duty period was 12 hours which provides an opportunity for 7-9 hours of sleep.

The employee reported no issues with sleep. The employee worked nights in the days leading up to the incident. The employee reported feeling fully alert at the time of the incident and had no symptoms of fatigue in the time leading up to the incident.

Button RTC

The Button RTC 30-day work schedule leading up to the incident was compliant with WMATA's Policy/Instruction 10.6/1 Hours of Service Limitations for Prevention of Fatigue. It did not present

a significant risk of impairment due to fatigue. The incident time of day did suggest an increased risk of fatigue-related impairment. Based on the Button RTC interviews, no personal factors would have increased the likelihood of fatigue-related impairment. The Button RTC had no history of sleep issues to report. The employee worked nights in the days leading up to the incident.

Radio RTC

The Radio RTC 30-day work schedule leading up to the incident was compliant with WMATA's Policy/Instruction 10.6/1 Hours of Service Limitations for Prevention of Fatigue. It did not present a significant risk of impairment due to fatigue. The incident time of day did suggest an increased risk of fatigue-related impairment. Based on the Radio RTC interviews, no personal factors would have increased the likelihood of fatigue-related impairment. The Radio RTC had no history of sleep issues to report. The employee worked nights in the days leading up to the incident.

Post-Incident Testing

After reviewing the RTC's post-incident testing results, SAFE determined both RTC employees complied with the Drug and Alcohol Policy and Testing Program 7.7.3/6. On January 23, 2021 at 1507 hours, SAFE shared findings with TRST that an Improper RWP met the testing criteria for post-incident testing. TRST removed the RWIC from service on January 24, 2021 at 2300 hours for the post-incident testing; however, WMATA did not test the TRST employee since the 32-hour testing parameters had been exceeded. Under WMATA's current Drug and Alcohol Policy and Testing Program Policy Instruction 7.7.3/6, Post-Incident Testing may be performed on employees and contractors whose performance cannot be "completely discounted,"

Probable Cause Statement

The probable cause of the Improper RWP on January 22, 2021, at Georgia Ave-Petworth Interlocking was a deviation from established rules and procedures, a lack of communication, an inexperienced RTC, and common departmental practices not outlined in the MSRPH which caused practical drift to occur between the respective departments. Specifically, the ROCC automatically grants work crews FT to start work on Supervisory and Red Tag Outages and does not require RWICs to request FT while setting up their work location while using a prime mover or other unit.

The RWIC and the RTC failed to adhere to MSRPH 5.13.7 ETO and SOP 28. The RWIC involved in this incident did not request FT to enter the roadway while disembarking their unit to place shunts and mats. ROCC was unaware that TRST RWIC disembarked PM45 and had entered the roadway to complete setting up their protected area. Consequently, ROCC authorized the movement of PM61 from Track #2 to Track #1 towards Fort Totten Station.

Contributing to this event, the Button's RTC allowed ATC to access a room at Braddock Road Station to de-energize the interlocking, which caused the switch to go out of correspondence. This action created a delay for non-revenue trains to enter the yard and tandem delays for work crews scheduled to reach their working locations. Further contributing to the incident, the Radio and Button RTC were switched in the middle of the fieldwork crew transition and subsequent actions were not communicated well. Additionally, the MSRPH does not have language explaining how to use a unit to set up a work location during a Red Tag or Supervisory Outage and when the RWIC control begins.

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
91500_SAFECAPS_ROCC_001	ROCC shall conduct a lessons learned to address the appropriate SOP 28 and ETO 5.13.7 procedures emphasizing when the RWIC controls a work location to include FT request processes and movement of units within a work location not relinquished to the RWIC.
91500_SAFECAPS_RAIL_002	The Rail Services department shall distribute a Memorandum defining the proper procedures for setting up work locations for Supervisory and Red Tag Outages, emphasizing the transfer of work location control from ROCC to the RWIC.
91500_SAFECAPS_SAFE_003	SAFE shall undertake a review of the MSRPH to identify opportunities to clarify the language within MSRPH explaining "utilizing a unit" to set up a work location. SAFE is currently conducting a review and revision to the MSRPH to incorporate changes the align with the SMS processes.

Appendices

Appendix A – Interview Summaries

Buttons RTC

The Button RTC is a WMATA employee with four years of experience as a Rail Traffic Controller and 14 years of service in various positions such as Interlocking Operator, Train Operator, Bus Operator.

When I arrived, I received the turnover. Operations changed the meet train processes due to the presidential inauguration. Two trains were leaving Franconia-Springfield Station going to the yard, so I could not get the work locations out. I was on the radio at this time. Train ID 392 crossed over from Track #1 to Track #2. After the train crossed over at Braddock Road Station, we had to normal up the interlocking at Braddock Road Station. The switches went out of correspondence. After several attempts to normal up the interlocking, I made notifications of the event, and non-revenue trains were holding to get into the yard. This resulted in holds to the work locations from getting started.

Come to find out, ATC was in the room at Braddock Road Station, but I never knew because my partner never told me. When I asked my partner the reason, they said he was taking power from the switches. As an experienced controller, I would have suggested to my partner, ATC would have to wait until the non-revenue trains traversed the area before authorizing ATC access to remove the power. It took approximately 20 minutes in-turn; this held up the work locations from getting started. The Buttons Controller was new to the position.

At 01:00 hours, I still didn't get units out to their work location because Geometry Vehicle (GV01) needed to do track testing which caused another delay; at around 01:30 hours, the Buttons controller and Assistant superintendent notified them all red tags were issued. Around 01:45 hours, I was switched from the radio to the buttons. During this time, I was trying to decipher what my partner has and has not done. I am trying to tell the Radio RTC that it was FT for the power personnel going out to racking the breakers and hot sticking and confirmed to verify power was de-energized. So, I am trying to catch him up and myself since I was switched from radio to buttons. I tell them PM 61 is ready to move whenever you're ready to move it. Making a seem like I'm not rushing him. If you listen to the audio throughout the day, I keep asking them do they need help? Are you ok? Do you need a break? Do you need to walk away from the console to get yourself together? They said no. The Radio RTC gave PM61 permission to cross over from two to one, going to the work location at Fort Totten.

I received a call from the RWIC stated I crossed a unit over in my work location; I said no, I didn't. Where is your work location because I don't remember my partner putting anyone to work? The RWIC stated Georgia Ave Columbia. I told the RWIC to hold on, informed the Assistant superintendent, and ROCC subsequently removed the RTC's from the console. The RTC did not think they were in violation because they never knew the RWIC was working.

The RTC never knew the Radio RTC put them to work or on FT, although they stated the RWIC was put to work at 0200 hours.

When asked if a work crew could be put to work without proper protection setup, the Buttons RTC stated "No, the work location was not set up properly for the Radio RTC to put them to work. If a unit relinquishes FT and standing by at a red signal, I can cross a unit over from one track to another." The RTC went over the proper ETO work setup during the interview. SAFE confirmed the stated ETO setup was in alignment with the MSRPH. The RTC asked SAFE when the RWIC officially has the work location because nothing is stating when a person officially has a work location. Specifically, "When is it officially their work location when shunts and lights or part of their work location when they want to relinquish their FT to utilize their unit? Or when they request to clamp the interlocking? Can they go back to the roadway without requesting FT? I hear different answers?" SAFE explained the process according to SOP 28 and ETO 5.13.7.

Training: The RTC noted RTC's need more On-the-Job (OJT) training and recommended one or two months on each console. The RTC noted there is no checklist used to conduct red tag or supervisory outages; they use memory and training to recall the process. Additionally, verifying all the chain markers within GOTRS takes time when an employee takes down an adjacent track for safety they are not working on.

<u>RWIC</u>

The TRST Supervisor/RWIC is a WMATA employee with eight years of experience as a Structures Supervisor and RWIC. The TRST Structures Supervisor has 23 years of service in various positions such as Assistant Superintendent in TRST and Janitor.

The RWIC stated their work scope was insulator cleaning with a red tag outage at Columbia heights. The protected area was from 129+30 to 175+36 working limits 134+30 to 170 +36 at Georgia Ave-Petworth. The night of the event, they notified us there was a switch out of correspondence and needed to get trains in the yard; all track personnel standby stand clear do not request anything until we get the trains back to the yard. I asked to be on the list, ROCC instructed me to stand by. Power confirmed third rail power was de-energized. I briefed my crew, and ROCC called me via radio and stated the breakers are racked in your area; E02-04 signal red, blue block human form in effect hot stick and give ROCC a Chain Marker. Prior to that, I saw a unit come up on track two and then went into the tunnel. I didn't pay attention to it.

When ROCC gave me my permission, I checked the gaps on the south end and placed my shunts according to SOP on the Columbia Heights end. After I put my shunts down and verified the shunt with ROCC, ROCC stated they were standing by for the following shunt location. I called via radio ROCC and requested to relinquish my FT to utilize PM 45 because I had a 5000 feet area to set my second shunt. ROCC authorized the use of my unit. ROCC stated, at this time, you relinquished your FT standing by for the second shunt unit. I got on the unit and rode down to the E04-02 signal.

I stopped E1-166 +00 and said, you know what? I am not utilizing this interlocking today. At this time, it's like 01:45 hours. We have to give the tag back by 04:00 hours; I dropped my mat at E1-166+00, and I will just put my shunt at E1-175+00, which is on the other side of the interlocking. I dropped my map and started walking through the interlocking. When I heard on the radio PM61; you have permission to go from two to one from E1-170+00 where my map was supposed to be. I stopped at E1-168+00; the wheels are loud. I said, hold up ROCC is bringing a unit over while I'm setting up the area. The unit goes down, went on the platform where I would have had my shunts setup at E1-175+00.

I stopped and called ROCC; they put me on hold. I hung up and called back they put me on hold. The reason I am calling, I know they had a lot of chaos going on earlier are they getting ready to send another unit through here going towards Fort Totten. I called ROCC back and said, wait, do not put me on hold; you just crossed a unit over in my work area at Georgia Ave-Petworth. They stated, no, I didn't. I said yes, you did; you just crossed them over at E1-170+00; you guys were supposed to do all that before giving me my tracks to set up my protection. Another guy came on the phone and stated, let me talk to my superior. I stood by for a long time. They called me back, and it was too late to perform any work. We cleared the roadway and provided statements to ROCC.

SAFE asked about the understanding of utilizing a unit to set up ETO protection in a work area with FT Usage. The RWIC stated that there is no understanding. The ETO protection does not have anything about using your unit. That SOP is set up like you are walking and you do not have a unit, and you are under protection. To utilize your unit, you have to relinquish your FT. The SOP states, when you request ETO, you must request FT. That never happens; ROCC automatically gives us FT to set up our protection. All we do is state "RWIC 000 requesting my red tag outage at the respective Signal and Track location."

I was never taught to ask for FT to set up the interlocking or the other end of the work area after relinquishing our FT to ROCC when utilizing our units.

The RWIC confirmed that you are required to abide by signals while setting up your work location. SAFE then asked about preventing a recurrence? When we are in RWP class, it seems like the RWP trainers are living in fantasy land. The RWIC suggested that RWP trainers come out and see how it works. It does not happen as they say per SOP. It is what it is; I don't even know how to answer your question. It's like beating an unresponsive horse; we talk about it all the time, and we do not see anything happen.

Appendix B - Exclusive Track Occupancy Procedures

5.13.7 Exclusive Track Occupancy (ETO)

ETO is the authority issued by ROCC to the RWIC to control specific working limits on the Roadway. The exclusive authority to permit rail vehicle traffic through working limits rests solely with the RWIC.

RWIC Procedures to establish ETO Authority:

1. Contact ROCC and request FT for the purpose of setting up ETO; state line, track number, chain markers or station names of ETO work limits.
2. Request ROCC to cancel automatic signals, block calls and prohibit exits on any interlocking of any configuration contained within the work limits.
3. If applicable, request Third Rail to be de-energized using Supervisory or Red Tag power outage. Refer to MSRPH SOP 28 for all power outage requirements.
4. Personally verify, or designate someone (RWP Level 2 or 4) to verify, with a working Hot Stick or a VAD, that all sections of Third Rail in the work zone are de-energized. This must be done while wearing approved high-voltage electrical safety gloves.
5. Give ROCC confirmation that the Third Rail is de-energized with chain marker locations.
6. Install shunts with two (2) red lanterns or e-flares a minimum of 500 feet outside of each end of the work zone and confirm shunt locations with ROCC.
7. Place a reflective "END WORK AREA" mat in the gauge of the track to identify the work zone for the Roadway Workers.
8. Connect a WSAD(s) within visual and audible range of the work crews on each section of Third Rail in the work zone.
9. Clamp interlocking switch in the desired position, if applicable.
10. When all safety equipment is in place, contact ROCC and relinquish FT, inform ROCC the work limits are under ETO protection.

Attachment 1- MSRPH ETO Procedures

Appendix C – SOP 28 Removal of Third Rail Power Red Tag Outages

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
STANDARD OPERATING PROCEDURES

28.5.4 Removal of Third Rail Power and Establishment of a Work Area Under a Red Tag Outage.

28.5.4.1 The WMATA maintenance personnel that require the outage shall submit the request via GOTRS (General Orders – Track Rights System).

28.5.4.2 Prior to the start of work, the RWIC shall, contact the MOC to verify that the red tag has been activated and obtain the red tag number.

28.5.4.3 After receiving the red tag number from MOC and prior to beginning work, the RWIC shall contact ROCC by radio advising them of the red tag number and request permission to enter the track bed to test the third rail and protect the work area. The RWIC shall establish the appropriate protection and verify the necessary protection elements for the type of protection required with ROCC as defined in Appendix B.

28.5.4.4 Once verification between ROCC and the RWIC is complete according to Appendix B, control of the work area is passed from ROCC to the RWIC. ROCC shall not execute, nor authorize, movement of switches within the working limits without approval of the RWIC.

28.5.4.5 Prior to starting work, the RWIC shall brief the personnel of the work crew on applicable WMATA safety rules/procedures, track(s) involved, work area limits, the means of protection, safe areas in which to clear, red tag number and any restrictions on the work, and document meeting on department issued safety briefing form (see Appendix C of this SOP for example).

28.5.4.6 In the event the work continues through an MOC or ROCC shift change, it shall be the responsibility of the initial MOC or ROCC Supervisor to advise the relief person of the details involving the work taking place, including the name of the Red Tag Holder and/or the RWIC. ROCC Controllers shall contact and be briefed by the RWIC on the protection required / type of protection for work zones on their lines when changing shifts.

28.5.4.7 If the Red Tag Holder is to be relieved, both the original Red Tag Holder and the new Red Tag Holder must contact MOC and ROCC advising them of the change prior to making the change.

Attachment 1 – MSRPH SOP 28 procedures

Appendix D – Appendix B Insert for SOP 28

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
STANDARD OPERATING PROCEDURES

Appendix B to SOP 28

ROCC Coordination with Roadway Worker In-Charge

For Establishment of Work Zones

Protection Coordination	Inaccessible Track	Individual Train Detection	Exclusive Track Occupancy	Train Approach / Watchman-Lookout	Foul Time
Verify Shunt	R	NA	O	O	NA
Work Limits in GOTRS	R	NA	O	O	NA
Prohibit Exits	R	O	R	R	R
Speed Restriction Adjacent Track	O	NA	O	O	NA
Physical Barrier (i.e. Derailers / Switches Blocked/Clamped)	R	NA	NA	NA	NA
PPE	R	R	R	R	R
WSADS	R	NA	O	NA	NA
ROCC Notification/Pre-Fouling Briefing	R	R	R	R	R
Drop Circuits	NA	NA	O	NA	NA
Drop Signals	NA	NA	O	NA	NA
Announcements	NA	NA	R	R	R
Stop Train Movement	NA	NA	NA	NA	R

R = Required
O = Optional
NA = Not Applicable

Notice: All Rail ROCC Supervisors shall place the Human Form Indication as well as the Blocked Track Indication on the AIM screen at all fixed work locations.

Attachment 1 – Appendix B Checklist