



WMSC Commissioner Brief: W-0075 – Improper RWP – Takoma Station Interlocking – October 20, 2020

Prepared for Washington Metrorail Safety Commission meeting on April 13, 2021

Safety event summary:

An Automatic Train Control Maintenance (ATCM) crew that did not have enough personnel to perform a track circuit verification was conducting that work on a bobbing track circuit in the area of the Takoma Station interlocking when the Local Control Panel (LCP) operator turned the control key off and left the Train Control Room (TCR) to bring a shunt strap out for drop off to the crew on the roadway.

Typically at WMATA, this track circuit verification would be done with five ATC mechanics to ensure that there were two people in the TCR so that one person could focus on train movement and the other can focus on the testing process. The standard number of people for these tasks is outlined by ATCM management. In this case, only the LCP operator was in the TCR. The LCP operator got permission from the ROCC to bring the shunt strap to the next revenue train for drop off to the crew, but, by turning the key off, left the crew on the roadway without the approved Exclusive Track Occupancy (ETO) Roadway Worker Protection (RWP). The operator could have kept the key on and canceled routes when exiting the TCR to ensure red signals were in place to continue to protect the work crew.

The Rail Operations Control Center (ROCC) identified this issue a few minutes later when a Track and Structures (TRST) crew asked to pass through the ETO area. The ROCC controller saw that the interlocking control was "invalid" in the Advanced Information Management System (AIM).

The ROCC took control of the interlocking and instructed the ATCM crew to clear the roadway for pick up by a train.

Probable Cause:

The probable cause of this event was that a work crew was directed to perform testing without an adequate number of personnel, which led to the Local Control Panel Operator having to leave the Train Control Room. Insufficient training on the steps required if a Local Control Panel Operator must leave the TCR and the lack of documented steps or checklists to ensure that a work crew responding to an unexpected event have all the tools they need with them contributed to this event.

Corrective Actions:

Metrorail retrained the Roadway Worker In Charge on Level IV Roadway Worker Protection.

Metrorail also developed a lessons learned document for the ROCC that included reminders of ETO protection rules under local signal control.

WMSC staff observations:

Given the significant safety implications of local signal control, Metrorail should ensure that there is adequate training, procedures and monitoring for local control panel operators to safely carry out their duties.

Staff recommendation: Adopt final report.



Washington Metro Area Transit Authority

Department of Safety and Environmental
Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E20406

Date of Event:	10/20/2020
Type of Event:	Improper Roadway Worker Protection
Incident Time:	11:57 hrs.
Location:	Takoma Station Interlocking.
Time and How received by SAFE:	12:16 hrs. Safe On-call Phone.
WMSC Notification Time:	14:04 hrs.
Responding Safety Officers:	WMATA SAFE: No WMSC: No Other: N/A
Rail Vehicle:	None
Injuries:	None
Damage:	None
Emergency Responders:	N/A

Takoma Station – Improper Roadway Worker Protection

October 20, 2020

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Abbreviations and Acronyms

ARS	Audio Recording Service
ATCM	Automatic Train Control Maintenance
CMNT	Car Maintenance
ETO	Exclusive Track Occupancy
LCP	Local Control Panel
NOAA	National Oceanic Atmospheric Administration
ROCC	Rail Operations Control Center
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
RWIC	Roadway Worker in Charge
TCV	Track Circuit Verification
TRST	Track and Structures

Executive Summary

On Tuesday, October 20, 2020, an Automatic Train Control Maintenance (ATCM) personnel were standing by Takoma Station for permission to enter the roadway to perform a Track Circuit Verification (TCV) in the interlocking under Exclusive Track Occupancy (ETO), Local Signal Control (LSC), protection which enables an ATCM technician located in the Train Control Room (TCR) to act as the Local Control Panel (LCP) Operator with the ability to manipulate the signal and switch components within the controlled interlocking while the remaining crew were on the roadway. The Radio Rail Traffic Controller (RTC) contacted the Roadway Worker in Charge (RWIC) at approximately 11:03 hrs., and granted the RWIC permission to perform their TCV. The Radio RTC instructed the RWIC to have their personnel take local control of the interlocking panel prior to starting their TCV.

At 11:56 hrs., the LCP Operator contacted the Radio RTC on the telephone and requested permission to leave a shunt with the Train Operator on the next inbound train to drop the shunt off with the crew on the roadway and requested the location of the next incoming train. The Radio RTC notified the LCP Operator that the next train was inbound from Silver Spring Station and granted the LCP Operator permission to drop the shunt off with the next Train Operator on Track 2.

At approximately 11:57 hrs., the Takoma Station interlocking displayed an “Invalid” indication on the Advanced Information Management System (AIMS), indicating that the LCP Operator turned the control key, which in turn rendered the interlocking unattended while personnel remained on the roadway. At 12:01 hrs., a Track and Structures (TRST) Unit contacted the Radio RTC in an attempt to request authorization from ATCM personnel in Takoma Station interlocking to traverse through their work location. The Button RTC transmitted over the radio and contacted the Roadway Worker In Charge (RWIC) in an attempt to ascertain their position on the roadway. The RWIC stated that they were on the roadway standing by B07-02 signal. The Button RTC instructed the RWIC to contact the LCP Operator in the TCR to ascertain how they were utilizing ETO protection while the interlocking panel was currently in an “invalid” state. The Button RTC waited for a response from the RWIC to no avail.

At 12:04 hrs., the Button RTC took control of the interlocking and in tandem instructed Train ID 106, Track 1 in approach to B07-02 signal to stop their train and pick up ATC personnel in the interlocking. The Button RTC instructed the RWIC to board Train ID 106 and clear the roadway; they also notified the RWIC that they took local control of Takoma Station interlocking due to the LCP Operator relinquishing control of the interlocking while personnel remained on the roadway. The Button RTC notified the Rail Operations Control Center (ROCC) Assistant Superintendent and the ATC Supervisor desk. At 12:07 hrs., LCP Operator contacted the Button RTC on the telephone and was notified that the RWIC and personnel would be clearing the roadway due to the LCP Operator relinquishing local control of the interlocking while personnel were on the roadway. The ROCC Assistant Superintendent notified SAFE of the violation and the RWIC and associated personnel were subsequently removed from service and transported for post-incident toxicology testing. No injuries were reported as a result of this event.

SAFE's investigative findings determined, the Radio RTC granted the LCP Operator permission to place equipment on the next incoming revenue train and provided information on the train's arrival to the platform. Additionally, a Track and Structures Unit contacted the Radio RTC in an attempt to request authorization from ATCM personnel in the Takoma Station interlocking to traverse through their work location. It was at this time, according to the AIMS Display, the Button RTC observed that the ATCM was no longer in control of the interlocking.

The probable cause of this event was that a work crew was directed to perform testing without an adequate number of personnel, which led to the Local Control Panel Operator having to leave the Train Control Room. Insufficient training on the steps required if a Local Control Panel Operator must leave the TCR and the lack of documented steps or checklists to ensure that a work crew responding to an unexpected event have all the tools they need with them contributed to this event.

Final analysis of data were collected from systems of record and the results of interviews with staff, human factors failures occurred in this incident.

As a result of this investigation, SAFE makes the following safety recommendations:

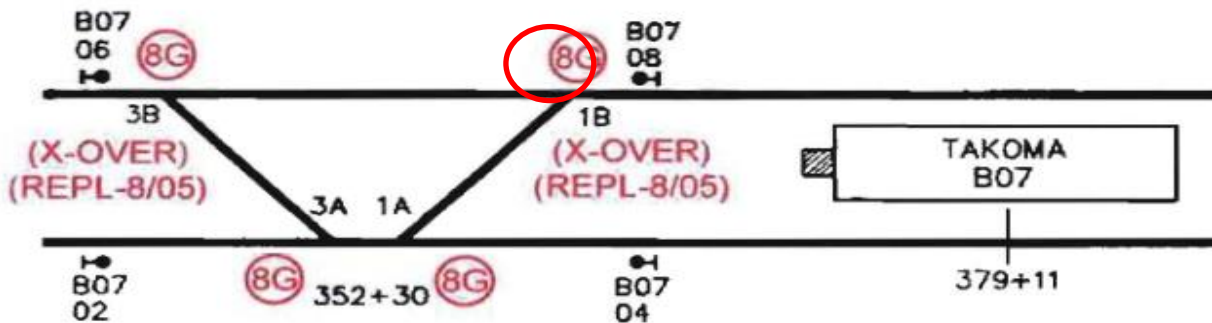
To ATCM, RWIC should undergo re-training in Level-4 Roadway Worker Protection rules and procedures.

To ROCC, provide a lessons learned to discuss the event and findings to include rules and regulations regarding ETO LSC protection.

Incident Site

Takoma Station Interlocking

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 notification of the Improper Roadway Worker Protection at Takoma Station interlocking on October 20, 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 facts and data associated with the incident.

Investigation Methods

The investigative methodologies included the following:

- Physical Site Assessment

- Formal Interviews – Three (3) individual(s) were interviewed as part of this investigation. Interviews included persons present during and/or after the time of the incident and those directly involved in the response process. The following individuals were interviewed:
 - RWIC
 - LCP Operator
 - Radio RTC

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

- Documentation Review – Collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
 - Employee Training Procedures & Records
 - Certifications
 - 30-Day work history review
 - MSRP
 - National Oceanic Atmospheric Administration (NOAA) data review

- System Data Recording Review – Collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback (Radio and Phone Communications)

Investigation

On Tuesday, October 20, 2020, ATCM personnel were dispatched to Takoma Station due to a bobbing track circuit located at CM B1 349+00 and B1 350+00 that caused a red aspect at B07-02 signal with an extended lockout for trains holding outside the associated signal. At approximately 11:03 hrs., the Radio RTC granted permission to the RWIC at Takoma Station to perform a TCV utilizing ETO, LSC protection and notify ROCC when personnel and equipment are clear from the roadway. At approximately 11:56 hrs., the LCP Operator contacted the Radio

RTC on the telephone and requested permission to leave a shunt with the Train Operator on the next inbound revenue train to be intercepted by the ATCM crew in the interlocking; the Radio RTC granted permission to the LCP Operator to drop the shunt off with the next inbound Train Operator that was currently in at Silver Spring Station.

At approximately 11:57 hrs., a Track and Structures Unit contacted the Radio RTC to request permission with the RWIC to traverse through Takoma Station interlocking to continue their track inspection. At the time of TRST's request, the Button RTC observed that Takoma Station interlocking displayed an "Invalid" indication on the AIMS indicating the LCP Operator turned the control key rendering the interlocking unattended while personnel remained on the roadway.

At 12:01 hrs., a TRST Unit contacted the Radio RTC in an attempt to request authorization from ATCM personnel in Takoma Station interlocking to traverse through their work location. The Button RTC transmitted over the radio and contacted the RWIC in an attempt to ascertain their position on the roadway. The RWIC stated that they were on the roadway standing by B07-02 signal. The Button RTC instructed the RWIC to contact the LCP Operator in the TCR to ascertain how they were utilizing ETO protection while the interlocking panel was currently in an "invalid" state. The Button RTC waited for a response from the RWIC to no avail.

At 12:04 hrs., the Button RTC took control of the interlocking and in tandem instructed Train ID 106 Track 1 in approach to B07-02 signal to stop their train and pick up ATC personnel in the interlocking. The Button RTC instructed the RWIC to board Train ID 106 and clear the roadway; they also notified the RWIC that they took local control of Takoma Station interlocking due to the LCP Operator relinquishing control of the interlocking while personnel remained on the roadway. The Button RTC notified the ROCC Assistant Superintendent and the ATC Supervisor desk. At 12:07 hrs., LCP Operator contacted the Button RTC on the telephone and was notified that the RWIC and personnel would be clearing the roadway due to the LCP Operator relinquishing local control of the interlocking while personnel were on the roadway.

The ROCC Assistant Superintendent notified SAFE of the violation and the RWIC and associated personnel were subsequently removed from service and transported for post-incident toxicology testing. No injuries were reported as a result of this event.

SAFE investigations from the ARS include OPS 1, Button RTC Phone Communications, Radio RTC Phone Communications and ROCC Assistant Superintendent Phone Communications.

SAFE determined that the Radio RTC granted the LCP Operator permission to place equipment on the next incoming revenue train, also providing information when the train will arrive on the platform. Additionally, a Track and Structures Unit contacted the Radio RTC in an attempt to request authorization from ATCM personnel in the Takoma Station interlocking to traverse through their work location. It was at this time the Button RTC observed that according to the AIMS Display, ATCM was no longer in control of the interlocking.

Chronological Timeline of Events

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

11:03:16 hrs.	The Radio RTC granted the RWIC permission to perform their track circuit verification utilizing ETO, LSC protection. [Radio]
11:56:13 hrs.	The LCP Operator contacted the Radio RTC on the telephone requesting permission to drop a shunt of with the next inbound Train Operator for the RWIC to intercept from the Train Operator. The Radio RTC granted the LCP Operator permission. The LCP Operator requested the location of the next inbound train; the Radio RTC notified the LCP Operator that the next train was located at Silver Spring Station. [Phone]
11:57:06 hrs.	The AIMS displayed Takoma Station interlocking in an "Invalid" state. [AIMS] TRST attempted to contact the RWIC to traverse their work location to no avail. [Radio]
12:01:18 hrs.	TRST again attempted to contact the RWIC to traverse their work location to no avail. [Radio] The Button RTC contacted that RWIC to ascertain their location on the roadway. The RWIC reported they were standing by B07-02 signal. The Button RTC attempted to ascertain how they were utilizing ETO protection with the interlocking in an "Invalid" state. [Radio]
12:04:12 hrs.	The Button RTC took control over the interlocking at Takoma Station and instructed the RWIC to clear the roadway and board Train 106, Track 1 on approach to B07-02 signal. [AIMS] and [Radio]
12:04:41 hrs.	The Button RTC notified the ROCC Assistant Superintendent and the ATC Supervisor desk. [Phone]
12:07:10 hrs.	The LCP Operator contacted the Button RTC and was notified that the RWIC was removed from service due to the LCP Operator relinquishing control of the interlocking while personnel were on the roadway. [Radio]

Advanced Information Management System

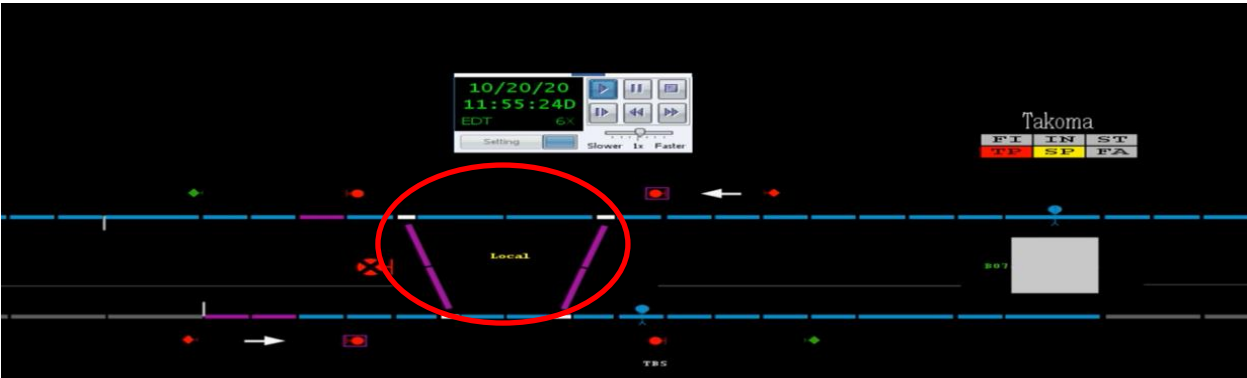


Diagram 1: AIMS indication displaying that the LCP Operator has “Local” control of the interlocking.



Diagram 2: AIMS displaying the interlocking in an “Invalid” state indicating the control key has been turned, allowing for ROCC to take control.

Note: Lunars are set at B07-02 and B07-08 signals.

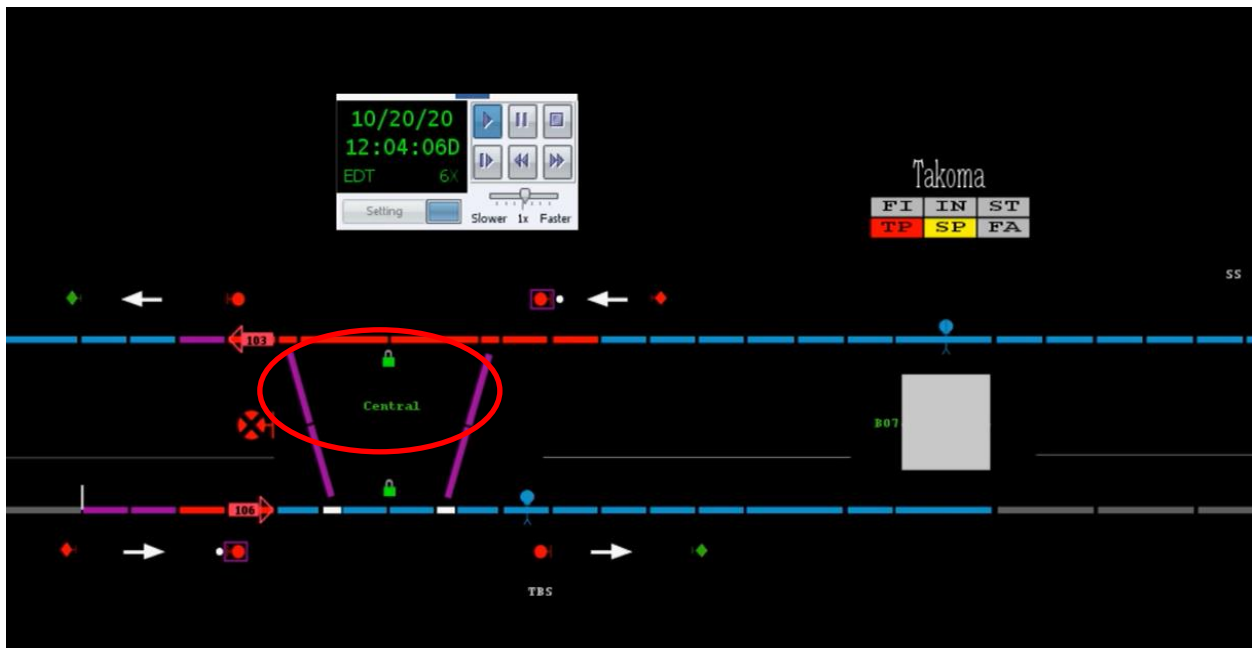


Diagram 3: AIMS displaying ROCC in control of the interlocking.

Interview Findings

Based on the investigation into the Improper Roadway Worker Protection event, SAFE conducted three (3) investigative interviews and identified the following key findings associated with this event, as follows:

Prior to the incident, the LCP Operator contacted the Radio RTC and requested the location of the next inbound train and requested permission to drop off a shunt to the RWIC in the Interlocking. The Radio RTC notified the LCP Operator that the next train was inbound and granted permission to leave the shunt with the Train Operator on track two. The LCP Operator turned the panel key leaving the interlocking in a invalid state in order to return to the TCR which required a key to enter.

Findings

- The LCP Operator, upon their request, was given permission from the Radio RTC to leave a shunt with the next inbound Train Operator to give to the RWIC in Takoma Station interlocking, which required the LCP Operator to exit the TCR.
- ATCM did not have the required number of personnel to perform the track circuit verification, which requires a total of 2 personnel in the TCR.
- The LCP Operator did not cancel routes after exiting the TCR to ensure trains did not traverse the interlocking accordance with MSRPB Train Roadway Worker Protection, section 5.13.7, “*ATC personnel accomplish ETO utilizing LSC by taking local control of an interlocking to establish Roadway Worker Protection via speed restrictions and canceling routes.*”
- The Radio RTC granted the LCP Operator permission to drop a shunt of with the Train Operator to give to the RWIC located in the Interlocking.

Weather

At the time of the incident, the temperature was 86° F and clear. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA) – Location: Silver Spring, MD.)

Human Factors

Fatigue

Based on SAFE interview question related to Fatigue Factors and a review of all LCP Operator 30-day work history, SAFE determined, the employees’ hours of service were in accordance with WMATA’s *Fatigue Risk Management Policy 10.6* and *Hours of Service Limitations for Prevention of Fatigue Policy 10.7*.

Post-Incident Toxicology Testing

After reviewing all employee post-incident testing results, SAFE determined that the LCP Operator was not violating the Drug and Alcohol Policy and Testing Program 7.7. 3/5.

Probable Cause

The probable cause of this event was that a work crew was directed to perform testing without an adequate number of personnel, which led to the Local Control Panel Operator having to leave the Train Control Room. Insufficient training on the steps required if a Local Control Panel Operator must leave the TCR and the lack of documented steps or checklists to ensure that a work crew responding to an unexpected event have all the tools they need with them contributed to this event.

SAFE Recommendations

As a result of this investigation, SAFE makes the following recommendations:

To ATCM, RWIC should undergo re-training in Level-4 Roadway Worker Protection rules and procedures.s.

To ROCC, provide a lessons learned to discuss the event and findings to include rules and regulations regarding ETO LSC protection.

Appendix A - Interview Summaries

Interview Details

Office of Automatic Train Control (ATC)

Roadway Worker in Charge (RWIC)

The ATC Mechanic “C” is a WMATA employee with seven (6) years of experience as an RWIC and 7 years of service in various positions, ATC helper.

The RWIC stated that they were dispatched to Takoma Interlocking to investigate a down track circuit on track two causing trains to lose speed commands due to a B07-08 signal displaying a red aspect causing extended delays to the system. The RWIC stated that after personnel conducted their Roadway Job Safety Briefing on Silver Spring platform, they requested permission from ROCC to perform the Interlocking inspection which required a train drop off and utilizing ETO protection. Upon receiving permission to perform the Interlocking inspection the RWIC and personnel boarded the next train and was dropped off in the Interlocking on track two. The RWIC stated that after personnel were finished performing their maintenance on the roadway, they contacted the LCP Operator to perform the track circuit verification process to complete their work. The RWIC stated that they were missing a shunt needed to perform the track circuit verification; the RWIC stated that they had personnel clear the roadway while they contacted the LCP Operator on OPS 11 to have a shunt transported to them to complete the track circuit verification. The RWIC reported that the LCP Operator exited the TCR and stood on the platform awaiting the next inbound train. The RWIC reported that they did not know at the time that the LCP Operator removed the panel key to exit the TCR. The RWIC reported that they

received a radio transmission from ROCC notifying them that they were not adequately protected and instructing them to clear the roadway. The RWIC stated that the LCP Operator contacted ROCC on the telephone to request to drop the shunt off with the next Train Operator on track 2 but did not release the control panel back to ROCC. The RWIC reported on the day of the incident there was a total of 4 personnel in their crew; a total of 3 personnel was on the roadway with one person located in the TCR. The RWIC stated that typically they would need a total of 5 ATC Mechanics to ensure 2 personnel remained in the TCR; the RWIC also stated that there was a shortage of personnel and being that the Interlocking was not clamped the maintenance required was considered an emergency.

Local Control Panel Operator (LCP)

The ATC Mechanic "B" is a WMATA employee with seven (7) years of experience as a Mechanic and 2 years of service in various positions, ATC helper.

The LCP Operator stated that upon completion of the RJSB they contacted the Button RTC to get permission to acquire control of the Local Control Panel. The LCP Operator stated that the RWIC and personnel on the roadway were preparing to complete their investigation when they realized they left a shunt in the TCR. The LCP Operator stated that they contacted ROCC and spoke with a male RTC and requested the time the next train would be approaching the platform on track two; the LCP Operator stated they told the RTC that they needed to place a shunt with the next inbound train to allow the RWIC to intercept the shunt and complete their track circuit verification. The LCP Operator reported that after receiving permission to report to the platform to give the Train Operator the shunt, they contacted the RWIC to ensure personnel were standing by for train movement. The LCP Operator stated that they placed a single lunar at B07-08 signal to ensure that the train carrying the shunt would traverse the interlocking and removed the panel key. The LCP Operator stated that they did not turn the Local Control Board over to ROCC because they exited the room for only a minute. The LCP Operator reported that when they returned to TCR they were notified that they were removed from the roadway. the LCP Operator reported that they did not complete their track circuit verification in full.

Rail Operations Control Center (ROCC)

Radio Rail Traffic Controller

The Rail Traffic Controller is a WMATA employee with seven (2) years of experience as a Rail Traffic Controller and 3 years of service in various positions, Student Rail Traffic Controller.

The Radio RTC stated that they received a call on the telephone from the LCP Operator stating that the RWIC left a piece of equipment in the TCR room that was needed on the roadway. the Radio RTC reported that he notified the LCP Operator the location of the next inbound train and allowed the LCP Operator to give the next Train Operator the equipment. The Radio RTC reported that at the time of the request they were under the impression that the LCP Operator would leave the panel key in the control board because the LCP Operator did not request to turn the Local Control Board back to ROCC. The Radio RTC

then stated that a TRST crew requested to go direct to the ATC crew on the roadway at Takoma Interlocking to ask permission to traverse their work location to continue to their track inspection; at this time the Button RTC noticed the AIMS screen displayed that Takoma Interlocking was no longer in local control. The Radio RTC then stated that the Button Controller then took over radio communications to inquire about the location of the RWIC and notify them that they were not properly protected and instructed personnel to clear the roadway.