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WMSC Commissioner Brief: W-0181 – Improper Door Operation – Judiciary Square Station – May 17, 2022

Prepared for Washington Metrorail Safety Commission meeting on September 20, 2022

Safety event summary:

A Train Operator opened the train's doors on the wrong side when the Red Line train (Train 117) was stopped and properly berthed at Judiciary Square Station. The doors were open on the incorrect (left) side of the train for approximately 10 seconds. The Train Operator opened the doors on the correct (right) side of the train and reported the improper door operation to the Rail Operations Control Center (ROCC) as required.

The Train Operator had not looked out the cab window to verify the platform side prior to opening the doors as specified in Metrorail procedures. Approximately 3 seconds after opening the doors on the incorrect side of the train, the Train Operator pushed the door close button. Due to the built-in delay of approximately 2 seconds (0-4 seconds) before the doors began to close, followed by the 2-3 seconds it takes for the doors to fully close, the doors were open on the incorrect side for a total of approximately 10 seconds.

Metrorail responded appropriately to this event. This includes the Rail Traffic Controller having the Train Operator perform a ground walkaround of the train and having a Rail Supervisor take over operations of the train.

The Train Operator stated in an investigative interview that they were distracted thinking about recent safety issues.

Probable Cause:

The probable cause of this event was a loss of focus on train operation.

Corrective Actions:

In response to this and other events, Metrorail conducted a "safety blitz" (series of communications to emphasize a topic) regarding improper door operations events.

Metrorail is increasing interactions with frontline employees to discuss recent safety concerns.

WMSC staff observations:

The WMSC notes that the Train Operator responded appropriately after making the error of opening the doors on the wrong side of the train, including by reporting this to the ROCC.

Washington Metro Area Transit Authority
Department of Safety and Environmental Management (SAFE)

FINAL REPORT OF INVESTIGATION A&I E22303

Date of Event:	5/17/2022
Type of Event:	O-15(a) - Improper Door Operation
Incident Time:	07:01 hours
Location:	Judiciary Square Station, Track 2
Time and How received by SAFE:	07:01 hours Mission Assurance Coordinator (MAC) Desk
WMSC Notification Time:	07:47 hours
Responding Safety Officers:	WMATA SAFE: No WMSC: No Other: N/A
Rail Vehicle:	Train ID 117 (**L**3222/23**x**3128/29**x**3248/29**T**)
Injuries:	None
Damage:	None
Emergency Responders:	N/A
SMS I/A Number	20220517#100376

Table of Contents

Abbreviations and Acronyms

ARS	Audio Recording System
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
FT	Foul Time
MAC	Mission Assurance Coordinator
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic and Atmospheric Administration
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
ROCC	Rail Operations Control Center
SAFE	Department of Safety
SMS	Safety Measurement System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

On Tuesday, May 17, 2022, at approximately 07:01 hours, the Train Operator of inbound Red Line Train ID 117, operating in the direction of Shady Grove Station, opened the doors on the opposite side of the platform at Judiciary Square Station, Track 2. Train ID 117 immediately contacted the Rail Operations Control Center (ROCC) Rail Traffic Controller (RTC) and informed them of the occurrence. The RTC instructed the Train Operator to hold their position, secure the operator's cab, key down, make good announcements, conduct a radio check with their handheld, and standby.

The RTC dispatched an Office of Rail Transportation (RTRA) Supervisor to Judiciary Square Station to assist the Train Operator. At approximately 07:04 hours, the RTC informed the Train Operator that they had Foul Time (FT) to complete a ground walkaround. The ground walkaround was completed, and the RTC instructed the Train Operator to offload the train of customers. The customers were cleared from the train and the RTRA Supervisor took over the operations of Train ID 117. There were no injuries or damage because of this incident.

The root cause of this Improper Door Operation was a human factors error due to distractions. The Train Operator's focus was on a recent fatality at Brookland Station, issues with recertification, and the thought of jumpers while they were operating the train. The Train Operator experienced a cognitive lapse that resulted in the unintentional activation of the left side door open push button at a split station platform, which requires a right-side door operation. This action caused the doors to open on the non-platform side.

Incident Site

Judiciary Square Station, Track 2

Field Sketch/Schematics

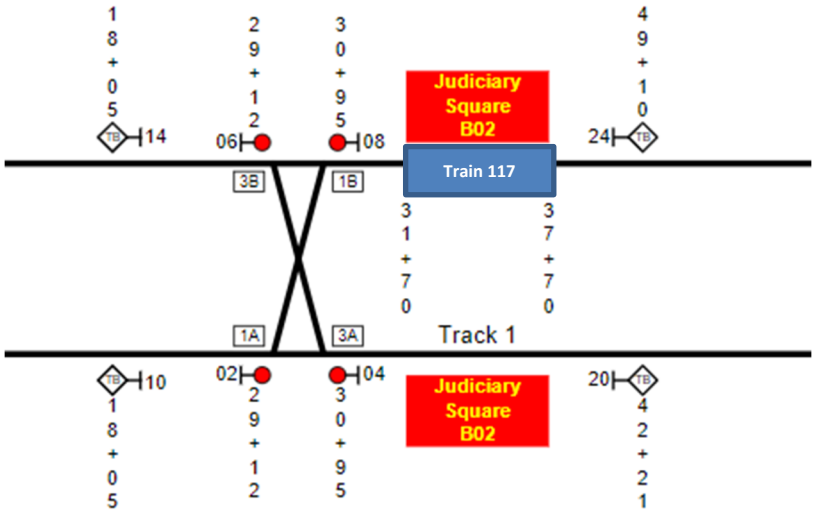


Figure 1: Shows the location of Train ID 117 when the improper door operation occurred.

Purpose and Scope

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

Investigative Methods

The investigative methodologies included the following:

- Site Assessment through document review.

- Formal Interviews – SAFE interviewed one (1) individual as part of this investigation:
    - Train Operator

- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
    - Train Operator Training Procedures & Records
    - Train Operator 30 Day Work History
    - Metrorail Safety Rules and Procedures Handbook (MSRPH)
    - National Oceanic and Atmospheric Administration (NOAA) data

- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
    - Audio Recording System (ARS) playback, Ops. 1, Radio and Phone communications.
    - ROCS Spot Report
    - Vehicle Monitoring System (VMS)

Investigation

On Tuesday, May 17, 2022, at approximately 07:01 hours, the Train Operator of inbound Red Line Train ID 117, operating in the direction of Shady Grove Station, opened the doors on the opposite side of the platform at Judiciary Square Station, Track 2. Train ID 117 contacted the ROCC RTC and informed them of the occurrence. The RTC instructed the Train Operator to hold their position, secure the operator's cab, key down, make good announcements, conduct a radio check with their handheld, and standby. The RTC dispatched an RTRA Supervisor to Judiciary Square Station to assist the Train ID 117. At approximately 07:04 hours, the RTC informed the Train Operator that they had FT to complete a ground walkaround. The ground walkaround was completed. Then the RTC instructed Train ID 117 to offload customers. The customers were cleared from the train, and the RTRA Supervisor took over the operations of Train ID 117. Train ID 117 was removed from service for post incident vehicle monitoring system (VMS) downloads. There were no injuries or damage because of this incident.

Based on the Audio Recording System (ARS) playback [radio], the Train Operator of Train ID 117 reported to the RTC that they performed door operations on the opposite side of the platform at Judiciary Square Station, Track 2. The RTC then advised the Train Operator that the B03-08 signal was red, blue block protection was in place, and they had FT to conduct a ground walkaround.

An analysis of data collected and submitted documentation was reviewed. Based on a review of the Metrorail Safety Rules and Procedures Handbook (MSRPH), Train Operator was not in compliance with the following Operating Rules:

- SOP #40 – Door Operations / Station Servicing Procedures – 40.5.1.5.2 – "*Verify the platform side of the train by placing your head out of the cab window and first look and identify the platform.*

- SOP #40 – Door Operations / Station Servicing Procedures – 40.5.1.5.3 – *"Depress Open Doors button on the platform side of the train."*

Chronological Event Timeline

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

Time	Description
07:01 hours	Train Operator of Train ID 117: Contacted an RTC to report that they opened the doors on the opposite side of the platform. [Ops. 1]
07:02 hours	RTC: Instructed the Train Operator to hold their position, secure the doors, secure the cab, key down, make good announcements, radio check, and stand by. [Ops. 1]
07:02 hours	RTC: Contacted division to get the operator's name and payroll. [Phone-12051]
07:03 hours	Train Operator of Train ID 117: Informed the RTC they were keyed down and performing a radio check. [Ops. 1]
07:03 hours	RTRA Supervisor: Contacted the RTC and advised they were at Metro Center but would head to Judiciary Square Station to assist. [Ops. 1]
07:03 hours	RTC: Gave a 100% repeat back. [Ops. 1]
07:04 hours	RTC: Advised Train Operator of Train ID 117 that the B03-08 signal was red. [Ops. 1]
07:04 hours	Train Operator of Train ID 117: Gave a 100% repeat back. [Ops. 1]
07:04 hours	RTC: Informed Train Operator that blue block protections were in place, and they had FT with platform limit on Track 2, Judiciary Square, to complete a ground walkaround. [Ops. 1]
07:04 hours	Train Operator of Train ID 117: Gave 100% repeat back. [Ops. 1]
07:07 hours	RTC: Instructed Train Operator of Train ID 117 to offload the train and clear of customers. [Ops. 1]
07:07 hours	Train Operator of Train ID 117: Gave a 100% repeat back. [Ops. 1]
07:10 hours	Train Operator of Train ID 117: Confirmed a good ground walkaround and that the train was clear of customers. [Ops.1]
07:12 hours	RTC: Instructed the RTRA Supervisor to take over the train operations when they arrive at Judiciary Square, keep the train operator with them, and another supervisor will meet them. [Phone- 12052]
07:13 hours	Train ID 117 cleared of all customers.
07:18 hours	RTC: Instructed RTRA Supervisor to advise when they were keyed up on the Train ID 117. [Ops. 1]
07:21 hours	RTRA Supervisor: Advised the RTC that they were keyed up on Train ID 117. [Ops.1]

Time	Description
	Train ID 117 was transported not in service to Shady Grove Yard.

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

ROCS Spot Report

ID	Platform	length	dcode	Right door open	Right door close	dwell	Left door open	Left door close	dwell	Head Arrived	Tail cleared	cars	Headway door open to door open
110	B02-2	6	12	06:00:30	06:00:55	25				06:00:06	06:01:14	2000-2001.3231-3230.3157-3156	-
111	B02-2	6	12	06:11:30	06:11:50	20				06:10:58	06:12:16	6166-6167.6061-6060.6092-6093	11:00
113	B02-2	6	12	06:21:47	06:22:05	18				06:21:17	06:22:26	6010-6011.6042-6043.6067-6066	10:17
114	B02-2	6	12	06:33:28	06:33:45	17				06:32:54	06:34:05	2029-2028.2040-2041.3020-3021	11:41
115	B02-2	6	12							06:41:21	06:42:31	unknown	-
116	B02-2	6	12	06:51:28	06:51:52	24				06:50:58	06:52:14	3057-3056.3132-3133.3049-3048	18:00
717	B02-2	6	87	07:01:23	07:21:18	1195	07:01:08	07:01:18	10	07:00:37	07:22:57	3222-3223.3128-3129.3248-3249	9:40

Figure 2: Shows the time when the doors were opened on the wrong side of the platform.

The Office of Chief Mechanical Officer (CMOR) / Vehicle Monitoring System (VMS) Timeline

The VMS and SPOTS data provide evidence of an improper door Operation from Train ID 117 (L3222-23x3128-29x3248-29) at Judiciary Square Track 2 at 7:01:11 am 5/17/2022. Train ID 117 was berthed at Judiciary Square Station when the Left Door Open Push Button was depressed; as a result, the doors on the opposite side of the platform opened. The Left Door Close Push Button was depressed three seconds later, and the doors on the Opposite side of the platform closed. Doors on the opposite side of the platform were opened for a total of approximately 10 seconds. A door cycle on the platform side was performed later to service the station. Subsequently, the train was keyed down. During data analysis, no defects were observed; the doors responded as designed and opened due to commands entered through the door push buttons on Lead Car 3222.

Time	Description of Events
07:01:11	Left Door Open Switch Activated and Left Doors Open, DCKR(Door Check Relay) goes Low
07:01:14	Left Door Close Switch Activated, commanding doors to close
07:01:22	DCKR goes High, Indicating all doors closed and locked
07:01:27	Right Door Open Pushbutton activated, and Right Doors Open, DCKR goes low
07:01:36	Right Door Close Pushbutton activated, commanding doors to close.
07:01:44	DCKR goes High, Indicating all doors closed and locked

Figure 3: This shows the timeline of the door operations. DCKR is an acronym for Door Check Relay. This is a safety check of the ATC system. When all the doors have completely closed and locked, the DCKR relay energizes, permitting train movement, along with some other checks. The DCKR must be energized before the ATC will allow train movement

Parameter	Range	Default Value
Door close delay	0-4 seconds	2 seconds
Door close delay after reopening caused by obstruction	0-4 seconds	0.5 seconds
Delay time for energizing a stalled motor	1-30 minutes	10 minutes
Obstruction Detection Methods	A, B, or C	B
Opening and cushioning of door time	1.8 – 2.3 seconds	1.8 second
Door closing time	2-3 seconds	2.5 seconds
Filter time for LCDU microcontroller input E1, E2, E4, and E7 signals	50-100 milliseconds	50 milliseconds

Figure 4: Shows various time delays between different door operations. This explains why there are delays when the door close button is depressed and when doors actually closes.

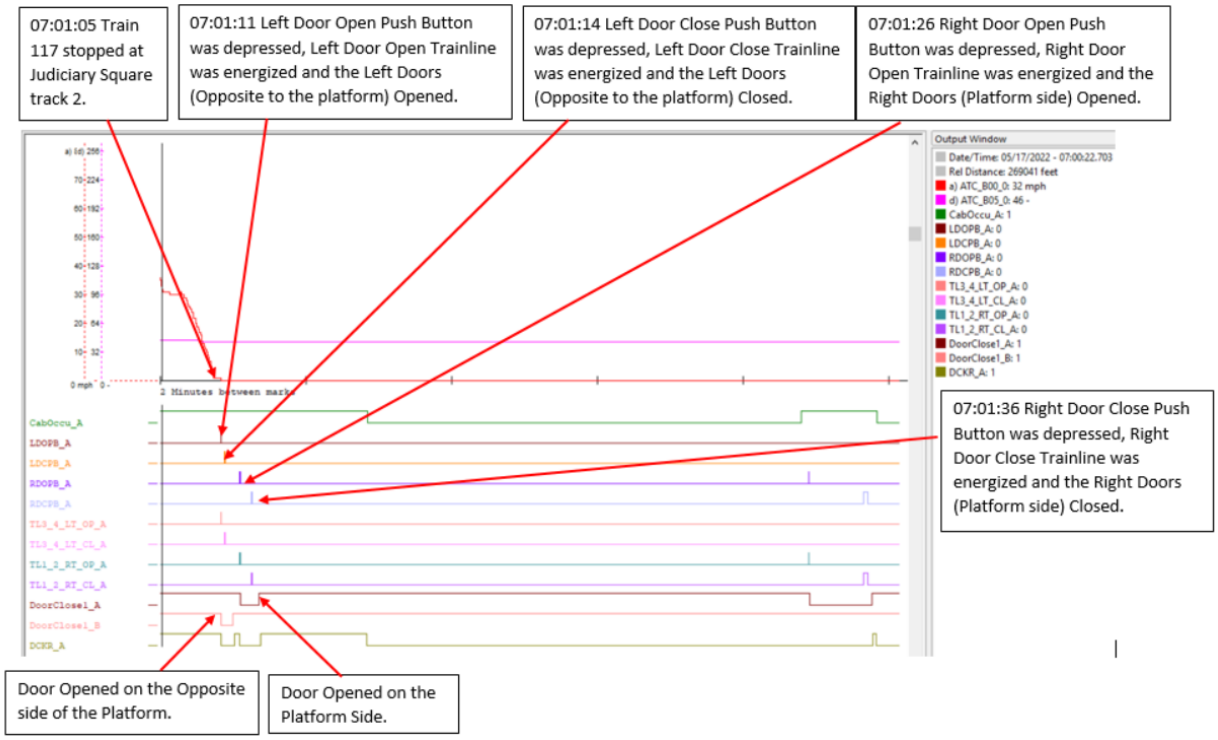


Figure 5: Shows the detailed timeline of the door operations for Train ID 117.

Interview Findings

The Train Operator was completing their first-round trip for the day when this event occurred. The Train Operator did not experience any mechanical issues while operating Train ID 117. The Train Operator stated that when they passed Brookland Station traveling inbound, they started thinking about their coworker involved in the fatality just days prior, recertification, and people jumping in front of the train.

The Train Operator stated they were trying to clear their head, but when they got to Judiciary Square Station, they stuck their head out the window and opened the doors off the platform side. When they realized they were on the opposite side, they immediately closed the doors and reported it to the ROCC. The Train Operator said they were well rested, so fatigue was not an issue. The Train Operator had a lot on their mind at the time.

Weather

On May 17, 2022, at the time of the incident, NOAA recorded the temperature as 57° F, with clear skies throughout the morning. The event occurred within a tunneled section of the rail system. Weather was not a contributing factor in this incident. (Weather source: NOAA) – Location: Washington, DC.)

Human Factors

Fatigue

Evidence of Fatigue

We evaluated conditions at the time of the incident to distinguish whether evidence of fatigue was present. No video of the involved person was available to ascertain whether evidence of fatigue was present. The Train Operator reported feeling fully alert at the time of the incident. The Train Operator reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

We evaluated incident data for fatigue risk factors. A risk factor for fatigue was present. The Train Operator worked day and night work in the days leading up to the incident. The incident time of day did not suggest an increased risk of fatigue-related impairment. The Train Operator reported keeping a regular sleep schedule in the days leading up to the incident. The Train Operator was awake for four (4) hours at the time of the incident. The Train Operator reported eight (8) hours of sleep in the 24 hours preceding the incident. The off-duty period was seventeen (17) hours which provides an opportunity for 7-9 hours of sleep. This was the same amount as the Train Operator's usual workday sleep durations. The Train Operator reported no issues with sleep.

Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined that the Train Operator was in compliance with the Drug and Alcohol Policy and Testing Program 7.7.3/6.

Immediate Mitigation to Prevent Recurrence

- Train Operator was removed from service for post incident testing.

Findings

- The Train Operator was completing their first-round trip for the day.
- The Train Operator failed to follow SOP #40 – Door Operations / Station Servicing Procedures.
- The Train Operator had a mental lapse due to a fatality that occurred on the Red line two days prior.
- The doors were open on the opposite side of the platform for approximately 10 seconds.
- The Train Operator immediately reported the incident to the ROCC.

Probable Cause Statement

The root cause of this Improper Door Operation was a human factors error due to distractions. The Train Operator's focus was on a recent fatality at Brookland Station, issues with recertification, and the thought of jumpers while they were operating the train. The Train Operator experienced a cognitive lapse that resulted in the unintentional activation of the left side door open push button at a split station platform, which requires a right-side door operation. This action caused the doors to open on the non-platform side.

SAFE Recommendations/Corrective Actions

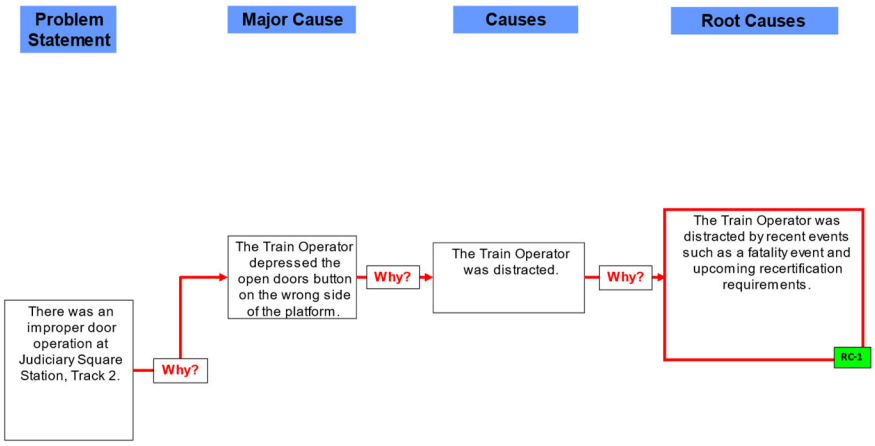
Corrective Action Code	Description	Responsible Party	Estimated Due Date
100376_SAFECAPS_RTRA_001	Train Operator will complete refresher training.	RTRA	Completed
100376_SAFECAPS_RTRA_002	Conducted RTRA wide safety blitz focused on increased improper door operations events.	RTRA	Completed
100376_SAFECAPS_RTRA_003	Increased RTRA Management daily interactions with front line employees to discuss recent safety concerns.	RTRA	12/31/22

Appendix A – Interview Summary

**The below transcript summarizes the SAFE interview conducted with the Train Operator. It reflects statements made by them and may conflict with other systems of record.*

The Train Operator is a WMATA employee with 21 and a half (21.5) years of service with five (5) years as a Train Operator. The Train Operator previously worked as a Bus Operator and Station Manager. The Train Operator is RWP Level 2 certified and will have to recertify in July 2023. The Train Operator mentioned feeling fully alert right before the incident. The Train Operator stated it was a typical Tuesday shift leading up to the incident. The Train Operator was completing their first-round trip when this incident occurred. As the Train Operator traveled inbound from Glenmont Station, when they passed Brookland Station, they started thinking about their coworker involved in the fatality days prior, recertification, and thoughts of people jumping in front of the train. The Train Operator stated these things were on their mind heavily. When the Train Operator arrived at Judiciary Square Station, they stuck their head out the left window and proceeded to open the doors. The Train Operator then realized they had opened the doors off the platform side, so they closed the doors and immediately reported the incident to the ROCC. The Train Operator said they normally do not have other things on their mind while operating the train, but this day was different. The Train Operator completed a ground walkaround as instructed by the RTC.

Appendix B - Root Cause Analysis



Root Cause Analysis