



WMSC Commissioner Brief: W-0046 – Collision in Alexandria Yard February 10, 2020

Prepared for Washington Metrorail Safety Commission meeting on September 22, 2020

Safety event summary:

A six-car, 3000 Series train struck a contractor work unit in the Alexandria Yard at 9:32 a.m. on February 10, 2020. Both vehicles derailed. There were no reported injuries.

With the approval of the Yard Interlocking Operator, the work unit accessed the rails at the yard grade crossing as part of testing for approval to operate in the Metrorail system. A job safety briefing was not conducted for the testing crew prior to accessing the tracks. The Interlocking Operator provided instructions on vehicle movement, and the Pilot of the work unit later reported to the interlocking operator that the work unit did not reach the intended signal, and the vehicle would need to return to the grade crossing.

During this event, the Interlocking Operator was watching a movie trailer on an electronic device in the Yard Tower and did not effectively manage multiple responsibilities.

The work unit was stopped in a position where it was partially over the adjacent track, a lead to the mainline.

The 3000 Series train coming off the mainline properly stopped at the mainline lead crossing where a signal was clear and the route was properly established toward Track 20.

The train operator saw the stopped work unit but made an assumption that the lunar signal and permission from the Interlocking Operator to proceed meant that the work unit was out of the way.

The lead car, 3205, struck the work unit. Four wheels of the train and all hi-rail wheels of the work unit derailed. The wheels of two trucks on the work vehicle remained about eight inches off the rail as it was wedged up by the rail car. At least one truck on Car 3205 was lifted approximately one foot off the rail.

The train was moving approximately 10 mph at the time of the collision.

Damage to Car 3205 included a bent truck center pin, bent cable tray, broken weld and broken cable tray bracket. Two trucks also had to be replaced.

Metrorail did not have work instructions or procedures related to dynamic testing of the dynamic envelope of work units. Power removal was not properly coordinated with the interlocking operator.

Probable Cause:

A lack of oversight of an interlocking operator distracted by watching a video, a lack of proper radio protocols, a lack of standard procedures for the testing of the dynamic envelope of work units, and a train operator and work unit crew who did not act to prevent the collision contributed to this event.

Corrective Actions:

Metrorail completed repairs to car pair 3204-3205 on March 11, 2020.

All interlocking operators and tower supervisors participated in a safety stand-down in early March that focused on the requirement for 100% repeat back and proper radio communications, the policies barring use of computers or other



electronic devices in any way that could cause distraction, the procedures for movement of work units within the rail yard that may or may not shunt, and the need to set complete leads for movements.

The interlocking operator involved was retrained on February 20, 2020 on communication procedures and track unit movement.

The train operator was retrained on operations SOPs and certain other procedures on February 28, 2020.

WMSC staff observations:

Metrorail did not conduct required drug and alcohol testing for the equipment pilot. The train operator, equipment operator and interlocking operator were tested.

Following this investigations, the WMSC has developed plans for additional inspections of distraction in yard towers.

Staff recommendation: Adopt final report.

FINAL REPORT OF INVESTIGATION A&I E20071

SMS 20200210#86262

Date of Event:	2/10/2020
Type of Event:	Collision
Incident Time:	09:32 hrs.
Location:	Alexandria Yard, Lead Track
Time and How received by SAFE:	09:33 hrs., Manager SAFE Construction On location
WMSC Notification Time:	09:55 hrs.
Responding Safety Officers:	WMATA SAFE: Yes WMSC: No Other: N/A
Rail Vehicle:	Train ID 719 - 3K 6-Car consist Lead Car 3205 Work Unit RSW3
Injuries:	None
Damage:	None
Emergency Responders:	Alexandria FD, SAFE, OEM, MTPD, RTRA, TRST, CMNT, ATCM

Executive Summary

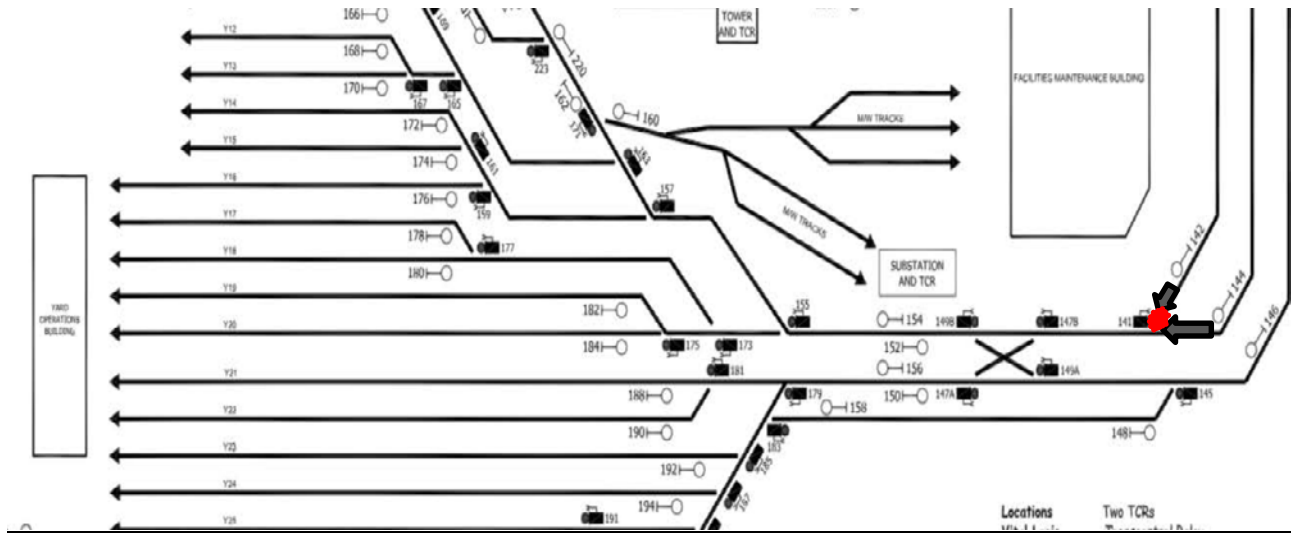
On Monday, February 10, 2020, at 09:42 hrs., SAFE was notified by SAFE Construction Manager located within Alexandria Yard that non-revenue Train ID 719, a 3K 6-Car consist Lead Car 3205 made contact with a contractor (RSW3) Pettibone unit in the proximity of C99-142 Signal at approximately 09:32 hrs. The consist was being stored at Alexandria Yard, Track 20 for storage. The I/O was performing yard moves at the time of the collision. This collision resulted in both vehicles' wheels losing the normal relationship (Derailment) with the running rails. The consist and RSW3 were removed from service for post incident investigation. No injuries were reported. The Train Operator (T/O), Equipment Operator (E/O), and Interlocking Operator were transported for post-incident testing and interviewed by SAFE.

The On-Call Safety Officer notified a WMSC representative at approximately 09:55 hrs.

Incident Site

Alexandria Yard, Signal C99-142

Field Sketch/Schematics



Investigation

At approximately 09:33 hrs., SAFE received a report from a SAFE Construction Manager (SCM) located at Alexandria Yard that a collision event occurred involving a legacy consist and a piece of work equipment. In a review of video playback, a six-car consist 3K vehicle made contact with a stationary contractor work unit (RSW3). The SCM further reported that both rail cars involved derailed as a result of the collision.

SAFE personnel were dispatched and responded to the scene. WMSC personnel reported to Jackson Graham Building (JGB) to participate in interviews of personnel involved. There were no reported injuries, and minimal damage was observed on site.

SCM, along with personnel from Car and Track Equipment Maintenance (CTEM), Car Maintenance (CMNT), and Track and Structure (TRST) were involved in the inspection of the work equipment as part of vehicle acceptance activities. Reportedly the work unit had undergone an initial first phase of testing that involved a static brake test and an ohm test to check the shunting capability of the work equipment. CTEM inspectors reported both tests were compliant with existing established thresholds. The second phase of the testing involved mounting the work equipment on the tracks via the roadway crossing and testing the ability of the work equipment to navigate around curves without making contact with any of the yard's infrastructure, i.e., the 3rd rail apparatus.

At approximately 09:05 hrs., the Alexandria Yard Interlocking Operator (I/O) gave permission to the WMATA Pilot of the contractor-operated work unit to mount it at the yard's roadway crossing. Once mounted, the I/O established a route from C99-162 signal to C99-142 signal and transmitted explicit instructions to the Pilot for the work unit to

clear C99-154 and report back to the tower. This instruction was repeated back by the Pilot.

During an interview with SAFE at the Alexandria Yard Interlocking Tower, the I/O stated that upon authorizing an absolute block to C99-154 Signal at 09:14 hrs., further instruction was given to the Pilot to contact the tower once the work unit was clear of C99-142 Signal. Due to clearance issues with the third rail approximately two (2) car lengths from C99-142 signal, at 9:27 hrs., the Pilot of the work unit contacted the I/O via radio and stated, "*from my location didn't make it quite to 142, can I get a lead back to the road crossing to disembark?*". The I/O replied, "*You're gonna' have to stand by; I have personnel in the interlocking.*"

Note: the work unit did not shunt, and there was no indication on the tower board of the location of the work equipment.

The actual location of the work unit was fouling movement on the adjacent track (mainline lead). At 9:31 hrs., the I/O granted permission to non-revenue six (6) car 3K train that had just come off the mainline to store on Track 20. In a review of video playback, the 3K consist made a proper stop at the mainline lead crossing on approach to C99-144 Signal, which was clear with an established route for the train to store on 20 Track. As the consist passed C99-144 Signal, the Train Operator (T/O) stated seeing the work unit but assumed since passing a displayed clear signal and a block provided by the I/O, that they had the right of way and would eventually clear past the work unit without incident. The lead car of the consist (Car 3205) traveled approximately 10 feet past the unit before making contact with the work equipment, which resulted in four wheels of the right side of the train and all wheels associated with the high rail unit of the work unit to derail. The Right side wheels of the two front trucks on Car 3205 rose approximately 8 inches off the rail and remained suspended in the air as the work unit remained in contact with the railcar.

Vehicle Program Services (CENV)

CENV completed the analysis of the downloaded Vehicle Monitoring and Diagnostic System (VMDS) and Event Recorder (ER). Details from the data analysis are as follows:

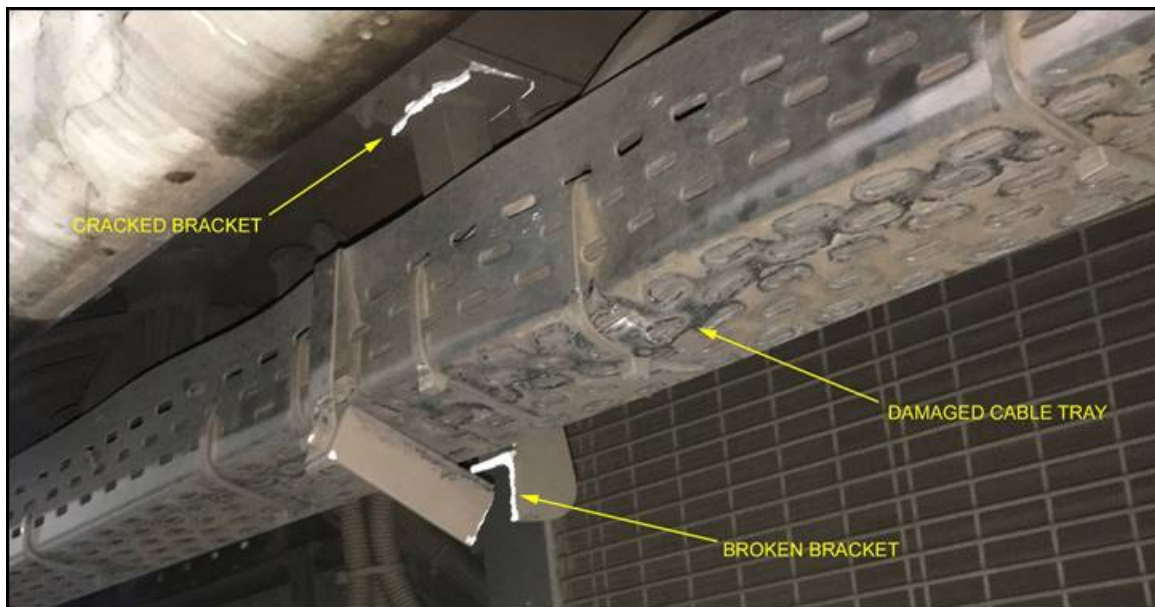
- Track Unit RSW3 was located on the inner loop ~90 feet past signal C99-142. As seen in the yard CCTV video footage, the work crew was standing on the roadway.
- VMDS data from Car 3204 shows that Car 3205 was the lead car.
- The consist was on the Rail Yard Middle Loop. VMDS data shows the train was traveling at ~10 MPH and began to slow as it approached RSW3 but continued to move past RSW3.

Based on the video:

- Based on the video:
- The consist traveled 8-10 feet past RSW3 when the front left tire came into contact with the side of the consist, just past doors 1 & 2, and traveled approximately another 6 feet dragging RSW3.
- This resulted in the right side of the consist being lifted ~10" off the track. Wheel 2- and 4-Wheel flange kept the truck on the rail.

Office of Car Maintenance (CMNT)

- The CMNT personnel performed an exterior and interior inspection of the affected car and found damage to Car 3205. Details of the damage are as follows:
 - Broken Cable Tray Bracket
 - Broken Weld to Car Body
 - Damaged and Bent Cable Tray



- A 3D laser scan of the front truck pin shows the truck center pin was slightly bent. See inspection analysis below.
 - Since this truck was lifted approximately 10-12" off the rail, the right side was held by the safety cable.
 - This still placed stress on the center pin, due to the entire weight of the car being placed on truck wheels 2 and 4.
 - The truck wheel bearings were also under significant stress as a result of the car weight.
 - Front and rear sides of the center pin showed normal wear at approximately 0.008" wear.

COMM

A comprehensive radio operational test at C99 was performed, the test was successful, and the signal was at an optimal level. Radio checks with Yard tower and ROCC on Ops 3 were performed all tests found loud and clear. Radio communication has been excluded as a contributing factor.

Weather

At the time of the incident, the temperature was 50°F and partly cloudy. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: National Oceanic Atmospheric Administration (NOAA) – Location: Alexandria, VA.)

Findings

1. There were no instructions or procedures for testing.
2. There were no instructions or procedures for testing dynamic envelope of the work vehicle.
3. No evidence of a safety briefing involving the personnel involved
4. Power removal was not coordinated between the Inspection Group and Rail Transportation Department (RTRA) Interlocking Operator
5. Multiple activities occurring simultaneously instead of focusing on an absolute block provided to the work equipment to ensure the work equipment cleared the desired block without incident
6. The shunting capability of work equipment was not tested once the vehicle was allowed to enter tracks.

Human Factors

Fatigue

Based on SAFE's review of the Pilot, I/O, and T/O's 30-day work history, it was determined that their 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

After reviewing the I/O and T/O's post-incident testing results, it was determined that both were not in violation of the Drug and Alcohol Policy and Testing Program 7.7.3/5. Therefore, being under the influence of a controlled substance has been excluded as a contributing factor.

The Pilot was not taken for Post-Incident Testing. During TRST's investigation, they ruled out the Pilot as a contributing factor to this accident.

Conclusion

Based on salient facts as part of this investigation, SAFE concludes the cause of this preventable accident was due to human error from the I/O and T/O.

1. Lack of proper radio communication by the I/O played a major part in the incident. After reviewing the audio recording, the Pilot informed the I/O that contractor (RSW3) Pettibone unit did not make it to C99-142 signal and from their location, they would like a lead back to the roadway to disembark. The I/O informed the Pilot to stand by due to personnel in the interlocking. Once the personnel in the interlocking cleared, the I/O gave Train ID 719 a lunar at C99-144 signal, and a lead to Track 20 without knowing the exact location of RSW3. The I/O should have ascertained the exact location of RSW3 before giving the consist a lunar at C99-144 signal. This could have prevented the collision. Additionally, it was also discovered in the audio recording from the Tower and I/O own admission that a movie trailer was being watched on the desktop computer during the time of the incident. This is a factor that may have played a part in distracting the I/O during the time of the incident, which is a clear violation of WMATA's Electronic Device Policy. **NOTE: The I/O was in violation of the following Metro Safety Rule and Procedures Handbook (MSRPH) and WMATA Policies: MSRPH 1.79, MSRPH 4227(c), Cardinal Rule 1.46 and Electronic Device Policy (P/I 10.3/5.03 (c)).**
2. Per MSRPH 3.1, the T/O aboard the consist has the overall responsibility of the train. Once the T/O saw RSW3 within the dynamic envelope of the train, the operator should have immediately stopped the train and contacted the tower. However, when interviewed, the T/O stated: "they thought it was enough room to clear the unit and assumed the tower would not send them to Track 20 unless there was enough room to clear the track unit." The T/O was a contributing factor causing the collision. The T/O failed to follow safety procedures. **NOTE: The T/O was in violation of the following WMATA Safety Rules and Procedures: Operating Rules (OR) 3.1, OR 3.18, OR 3.91, General Rules (GR) 1.54, and Cardinal Rule 3.1.**

Immediate Mitigation to Prevent Recurrence

- Train Operator (T/O), Equipment Operator (E/O), and Interlocking Operator (I/O) were removed from service for post-incident toxicology testing
- Train Consist and RSW3 Unit were removed from service.

Corrective Action

1. CMNT shall perform the following actions on car 3204-05 prior to its return to revenue service (**completed March 11, 2020**):
 - Inspect cables in damaged cable tray
 - Weld broken bracket to the car body
 - Weld the broken hanger bracket
 - Replace both trucks
 - Due to stress placed on the center pins, both pins should be Magna-Fluxed using an outside Lab to ensure the welds around the bearing slide pads, and center pin are not cracked.

2. RTRA shall take the appropriate actions deemed necessary to prevent recurrence of a similar collision event to include the following:
 - RTRA performed a Safety Stand-Down with all Interlocking Operators (I/O) and Tower Supervisors (T/S) from March 3rd-6th, 2020, to address a recent collision involving Class II vehicles in the rail yard. The issues identified and discussed are below:
 - Improper Radio Communications- 100% Repeat Back
 - Violation of WMATA's Electronic Device Policy
 - Movement of Class II Vehicles within the rail yard (shunting/non-shunting units)
 - Setting complete leads for movements
 - Retraining of the I/O on the communication procedures of the 100% repeat back protocol while communicating with personnel. Also, because not all track units shunt, I/O completed refresher training on the procedures for moving track unit throughout the yard commenced and was completed on 2/20/2020.
 - Retraining of the T/O on SOPs for yard and mainline operation, speed adherence, reading rail alignment, safe operation of rail vehicles commenced, and was completed on 2/28/2020.

Photos



Photo 1 - C99-142 Signal



Photo 2 - This collision resulted in both vehicles' wheels losing contact with the rails.