



WMSC Commissioner Brief: W-0149 – Collision – Shady Grove Yard – November 15, 2021

Prepared for Washington Metrorail Safety Commission meeting on March 8, 2022

Safety event summary:

On November 15, 2021, Tie Remover and Inserter (TRIPP) machine TR06 collided with a signal on Track 5 at Shady Grove Yard. The event was not reported to the WMSC until the following day, outside of the two-hour notification requirement in the WMSC Program Standard. Metrorail's Department of Safety and Environmental Management (SAFE) also did not learn of the event until the following day, which prevented field response.

At the time of the event, the TR06 Operator was removing ties on Track 5 at Shady Grove Yard. The Equipment Operator attempted to switch arm controls from left to right, but when doing so, did not fully retract and locked the right-side work head. The work head is an arm that clamps down on the tie being inserted or removed. As a result, both arms were extended when activated, and the right-side arm struck signal A99-146, knocking the signal to the ground. There were no injuries reported.

The Maintenance Operations Control (MOC) Automatic Train Control (ATC) desk received an automated message from Cintas Fire Protection indicating there was a system trouble signal coming from Shady Grove Yard one minute prior to the ATC Assistant Superintendent calling the desk to request a work order be created for the signal damaged by TR06.

Almost 40 minutes after the collision and 20 minutes after MOC had been notified, the Shady Grove Division Superintendent attempted to notify the ROCC Assistant Operations Manager (AOM), however the call went unanswered and was automatically transferred to the Ops 1 (Red Line) Rail Traffic Controller (RTC) desk. The RTC documented the information provided, including that ATC was on the scene, but no notifications were made regarding the event to other personnel.

The Equipment Operator was removed from service for post-event testing. Testing determined the Equipment Operator was not in violation of WMATA's Drug and Alcohol Policy and Testing Program.

When interviewed, the Equipment Operator expressed concern with the Nordco training they received, stating they did not feel the training thoroughly covers the operation of the four different pieces of equipment and did not allow enough seat-time to become proficient with the equipment. The Equipment Operator reported having very little experience operating the machine and indicated they had not operated this piece of equipment for approximately one month prior to the event. They also stated that similar events had previously occurred and had gone unreported.

Probable Cause:

The probable cause of this event is Metrorail's inadequate Equipment Operator training and supervisory oversight.

Corrective Actions:

Metrorail is working to add the use of the "Bump Check" technique to Tie Exchanger Operations portions of the TRIPP Manual and training, to include emphasis on the hazard of not locking the arms into place.



WMATA will modify TRIPP machines with sensors to detect fully retracted and locked arms in both the left and right directions. Visual “locked” indicators will be added to the operator’s console in the cab and a notice will be distributed to operators detailing these functions.

Metrorail is notifying TRIPP-machine qualified Equipment Operators of the need to use the Bump Check technique when switching operating sides to ensure the arm is properly locked via Maintenance Bulletin.

WMATA has committed to completing WMSC CAPs related to Equipment Operator training and recertification as required.

These CAPs include those related to findings in the Audit of Roadway Maintenance Machine (RMM) Inspection, Maintenance and Training issued in March 2021, such as CAPs addressing that not all Equipment Operators are fully trained on each type of vehicle they may be directed to operate, and at least some of their training has not included sufficient hands-on experience, that there is insufficient succession planning and training, and that equipment operator certifications have no expiration date.

WMSC staff observations:

Metrorail should ensure timely reporting and proper notifications are made to all appropriate personnel for proper response to events and in accordance with established procedure. Metrorail re-distributed a safety bulletin reminding some personnel of these requirements.

Staff recommendation: Adopt final report.



Washington Metro Area Transit Authority
Department of Safety and Environmental
Management (SAFE)
FINAL REPORT OF INVESTIGATION A&I E21584

Date of Event:	11/15/2021
Type of Event:	A-3: Collision
Incident Time:	15:50
Location:	A99 - Shady Grove Yard, Track 5
Time and How received by SAFE:	11/16/21 08:45 hours IMO desk
WMSC Notification Time:	11/16/21 12:20 hours
Responding Safety Officers:	WMATA SAFE: No WMSC: No Other: N/A
Rail Vehicle:	Nordco TRIPP Machine (TR06)
Injuries:	None
Damage:	A99-146 Signal
Emergency Responders:	None
SMS I/A Number:	20211116#96851

Shady Grove Yard – Collision

November 15, 2021

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Abbreviations and Acronyms

AOM	Assistant Operations Manager
ARS	Audio Recording System
ATC	Automatic Train Control
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
IMO	Incident Management Official
MOC	Maintenance Operations Control
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic and Atmospheric Administration
ROCC	Rail Operations Control Center
RTC	Rail Traffic Controller
RTRA	Office of Rail Transportation
RWP	Roadway Worker Protection
SAFE	Department of Safety and Environmental Management
SMS	Safety Measurement System
TRST	Office of Track and Structures
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

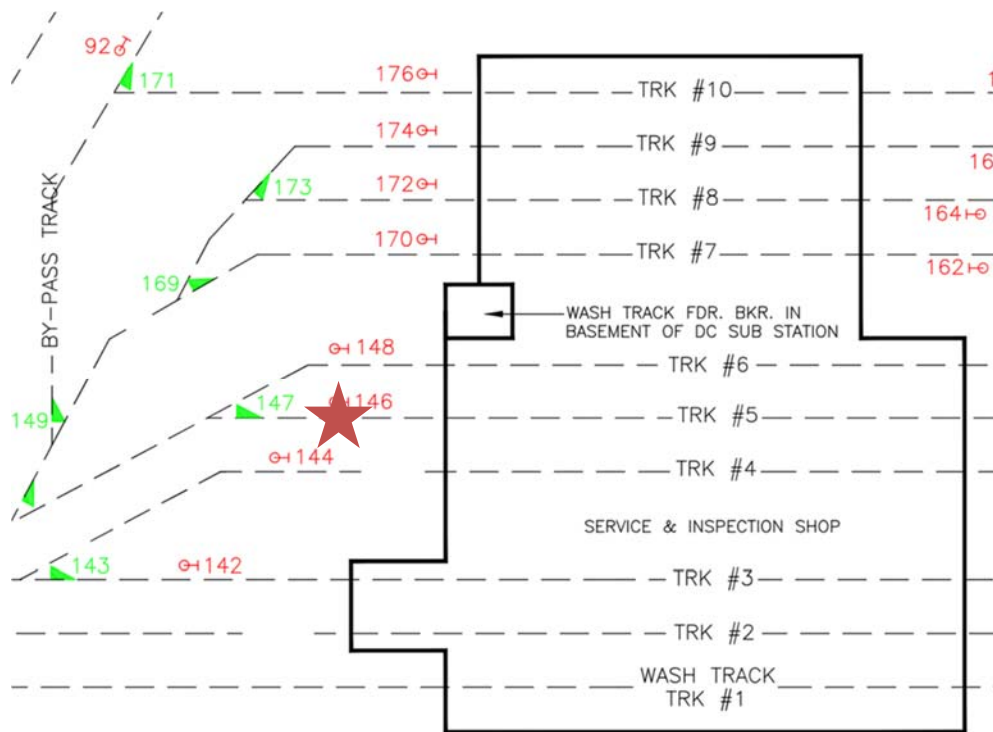
On Monday, November 15, 2021 at 16:10 hours, the Maintenance Operations Control (MOC) Automatic Train Control (ATC) Desk received a call from an ATC Assistant Superintendent to open a work order because A99-146 signal on Track 5 at Shady Grove Yard was damaged while Track and Structures (TRST) personnel were removing ties. At approximately 16:29 hours, the Shady Grove Superintendent from Rail Transportation (RTRA) contacted the Assistant Operations Manager (AOM) line, however it was not answered and auto transferred to the Red Line Desk in the Rail Operations Control Center (ROCC). The Superintendent reported that TRST personnel were removing ties on Track 5, when one of TR06's (TRIPP Machine) arms damaged A99-146 signal. The Rail Traffic Controller (RTC) that received the call from the Superintendent of Field Operations documented the event in their notes but failed to notify the on duty ROCC AOM of the situation. This resulted in the event going unreported to the Department of Safety and Environmental Management (SAFE) until November 16, 2021. The TR06 Operator was removing ties on Track 5 at Shady Grove Yard when they attempted to switch operating arm controls from left to right. When switching control of the operating arms, the Equipment Operator failed to fully retract and lock the work head. This resulted in both operating arms extending when activated, striking the signal with the right-side arm. There were no reported injuries as a result of this incident.

The probable cause of this event was human error while operating TR06. The TR06 Operator failed to ensure the work head was fully retracted and locked before changing operating sides. Contributing factors to this event were inexperience on the part of the Equipment Operator, inadequate training, and a lack of visual indicators on the equipment to confirm that the work heads are fully retracted and locked.

Incident Site

A99 – Shady Grove Yard, Track 5

Field Sketch/Schematics



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 preliminary investigative methodologies included the following:

- Site Assessment through document review.
- Incident recreation with TRST personnel.
- Formal Interviews – SAFE interviewed one (1) individual as part of this investigation:
 - TR06 Operator
- Informal Interviews – Collected through conversations with individuals during the investigation to provide background and supporting information.
- Documentation Review – A collection of relevant work history information and process documentation contained in Metro systems of record. These records include:
 - Employee Training Procedures & Records
 - Metro Safety Rules and Procedures handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA) data

- Certifications
- Roadway Job Safety Briefing Form
- System Data Recording Review – A collection of information contained in Metro Data Recording Systems. This data includes:
 - Audio Recording System (ARS) playback including MOC ATC Radio (12071 & 12072), Red Line-1 (12051)

Investigation

On Monday, November 15, 2021 at approximately 16:10 hours, the MOC ATC Desk received a call from an ATC Assistant Superintendent to open a work order because A99-146 signal on Track 5 at Shady Grove Yard was damaged while TRST personnel were removing ties. At approximately 16:29 hours, the RTRA Superintendent from Shady Grove notified the Red Line Controller at the ROCC by phone to report that TRST personnel were removing ties on Track 5, when one of TR06's arms damaged A99-146 signal. The Superintendent called the ROCC Assistant Superintendent line, however it was not answered and automatically transferred to the Ops 1 (Red Line) RTC desk. The RTC that received the call from the Superintendent documented what happened but failed to make additional notifications about the incident. This lack of communication prevented a field response and timely notifications. The IMO was not notified of this event until the following day. The Washington Metrorail Safety Commission (WMSC) released the scene and TRIPP Machine for all necessary repairs on November 16, 2021 at 14:38 hours.

As evidenced by the Equipment Operator's interview and written statement, the TR06 Operator was removing ties on Track 5 at Shady Grove Yard at the time of the event. When switching control of the operating arms from left to right, the Equipment Operator failed to fully retract and lock the right-side work head. This resulted in both operating arms extending when activated, striking the signal. During the interview process, TR06 Operator expressed concern with the required Nordco bundle training. TR06 Operator stated they did not feel that the bundle training thoroughly covers the operation of the four different pieces of equipment and didn't allow for enough seat-time to become proficient with the equipment. The Equipment Operator reported not operating this piece of equipment for approximately one month prior to the event.

On December 7, 2021, SAFE personnel went to Shady Grove Yard to perform a recreation of the event under controlled conditions with the TRIPP Machine. After setting up in a clear area, an Equipment Operator demonstrated the machine's operations. After describing the event to the Equipment Operator, they indicated that they could recreate the event. The Equipment Operator then demonstrated partially retracting the work head on the left side of the equipment, switching the lock and deenergize controls on the left side, and unlocking and activating the right-side controls. When the Equipment Operator activated the right-side controls, the work heads extended on both sides of the equipment as described by the operator involved in the event. This sequence resulted in the same outcome when performed from right-side to left with the work head. Equipment Operators on the site described using a "bump check" procedure to confirm that the work heads are fully retracted and locked prior to deenergizing one side and switching to the other operating side.

Chronological Event Timeline

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

Time	Description
16:09 hours	<u>MOC ATC Desk</u> : Received automated message from Cintas Fire Protection that there was a system trouble signal coming from Shady Grove Yard. [Phone]
16:10 hours	<u>ATC Assistant Superintendent</u> : Contacted the MOC ATC desk to open a work order due to TR06 damaging A99-146 signal on Track 5, at Shady Grove Yard. <u>MOC ATC</u> : Requested the employee's ID number and started to give the work order number but did not finish because the ATC Assistant Superintendent said they would receive the email with the information. [Phone]
16:29 hours	<u>Superintendent of Field Operations</u> : Contacted Red Line desk to report that TRST units were removing ties in Shady Grove yard and TR06 swung around and damaged A99-146 signal. They stated the crew supervisor may have reported the incident to the Track Desk and ATC was on the scene. <u>RTC</u> : Documented the information that was provided. [Phone] Note : ARS review could not identify further notifications or calls regarding the incident

**Note: Times above may vary from other system's timelines based on clock settings.*

Interview Findings

During the interview, the TR06 Operator mentioned they were not the original operator of TR06 and did not start operating TR06 until approximately 15:00 hours. The TR06 Operator stated they had little experience operating TR06 due to the same equipment operators always operating the machine. TR06 Operator admitted this incident was a mistake because they did not fully retract and lock the work head before enabling the opposite tie exchanger switch. The TR06 Operator mentioned they did not think the training provided for this equipment is adequate before operating on the mainline. TR06 Operator stated the units should have a safety device or signage that indicates that the work head is locked. He reported prior events, similar to this one, that were unreported due to no damage or injuries occurring.

Weather

On November 15, 2021, at the time of the incident, NOAA recorded the temperature as 55 ° F, with clear skies throughout the afternoon. SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA) – Location: Rockville, MD.

Human Factors

Fatigue

Signs and Symptoms of Fatigue

SAFE evaluated conditions at the time of the incident to distinguish whether evidence of fatigue was present. Video of the involved person was not available to ascertain whether evidence of fatigue was present. TR06 Operator reported feeling fully alert at the time of the incident. TR06 Operator reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

SAFE evaluated incident data for fatigue risk factors. Risk factors for fatigue were not present. The incident time of day did not suggest an increased risk of fatigue-related impairment. TR06 Operator reported keeping a regular sleep schedule in the days leading up to the incident. TR06 Operator worked day shift in the days leading up to the incident. TR06 Operator reported 7 hours of sleep in the 24 hours preceding the incident and was awake for 11 hours at the time of the incident. The off-duty period was 50 hours, which provides an opportunity for 7-9 hours of sleep. TR06 Operator reported no issues with sleep.

Post-Incident Toxicology Testing

- WMATA's Drug and Alcohol Program determined that the Operator of TR-06 was not in violation of the Drug and Alcohol Policy and Testing Program 7.7.3/6.

Findings

- Equipment Operator was trained and certified by WMATA to operate the equipment in June 2021.
- RTRA Superintendent contacted the Assistant Operations Manager line at ROCC, however it was not answered and auto transferred to the Ops 1 desk.
- ATCM personnel at the yard were contacted directly to respond and assist. The ATCM personnel opened a work order for the damage by contacting the MOC ATCM desk.
- The Operator of TR-06 had little practical experience operating the machine.
- There is no formal on-the-job training for Equipment Operators to become proficient in operating the TRIPP machine following certification.
- There are no visual indicators on console to indicate that work heads are fully retracted and locked.
- In practice, operators reported using the "bump check" technique to make sure the gripper arm is locked in before switching operating sides.
- "Bump Check" technique is only included in the Machine Shut Down Operations section of the TRIPP Manual and Training.

Immediate Mitigation to Prevent Recurrence

- TR-06 Operator was removed from service for post incident testing.
- Damaged signal was moved out of the track.
- ROCC held a Documented Discussion with the involved RTC regarding the requirement to escalate all reported events through their management chain.

Probable Cause Statement

The probable cause of this event was human error while operating TR06. TR06 Operator failed to make sure the gripper arm was properly locked in before changing operating arms. Contributing Factors to this event included insufficient engineering controls to indicate that the operating arms were locked and inexperience on the part of the operator.

SAFE Recommendations/Corrective Actions

Corrective Action Code	Description	Responsible Party	Due Date
96851_SAFECAPS_OPMS_01	(RC-1) Add use of the "Bump Check" technique to Tie Exchanger Operations portion of TRIPP Manual and Training. Include emphasis on hazard of failing to lock arms during initial and recertification practical.	OPMS	3/1/2022
96851_SAFECAPS_CENV_01	(CF-1) Evaluate adding visual indicator light on console to indicate when the work heads are fully retracted and locked. (ER 2112054)	CENV	Complete
96851_SAFECAPS_CENV_02	(CF-1) Modify Nordco TRIPP machines TR-04-TR07 with sensors to detect fully retracted and locked arms in both the left and right directions. Visual "locked" indicators will be added to the operator's console in the cab (ECC 2112054). Develop and distribute a Notice to Operators and OPMS that details the modification.	CENV	12/31/2022
96851_SAFECAPS_TRST_01	(RC-1) Notify TRIPP-machine qualified Equipment Operators of need to use Bump Check technique when switching operating sides to ensure arm is properly locked via Maintenance Bulletin.	TRST	1/28/2022
96851_SAFECAPS_ROCC_01	Reissue Safety Bulletin #21-04 to all ROCC and MOC personnel reminding them of required reporting when informed of rail events.	ROCC	1/28/2022
WMSC-21-C0088, WMSC-21-C0089	(RC-1) Complete WMSC CAPS related to Equipment Operator training and recertification.	OPMS	11/30/2022

Appendices

Appendix A – Interview Summary

The below narrative summarizes the interview with SAFE and represents the statements made by the involved individual. As such, times and details may present a conflict with the data contained in systems of record and procedural documents.

TR06 Operator has been a WMATA employee for thirteen and a half (13.5) years with 13 of those years as an Equipment Operator AA. TR06 Operator stated they felt fully alert leading up to when A99-146 signal was damaged. TR06 Operator reported not having any issues with sleep and typically gets seven and a half (7.5) hours of sleep prior to their work shift. TR06 Operator is certified Roadway Worker Protection (RWP) Level 2 and must recertify in January 2022. TR06 Operator stated they completed a RJSB before they started work. TR06 Operator stated that in the morning, their duties included placing plates under the ties, screwing spikes, and placing insulators on the third rail since they were not operating equipment. TR06 Operator stated they started operating TR06 around 15:00 hours. TR06 Operator started operating TR06 because the previous Operator changed duties to assist another crew with a switch on the crossover at A99. TR06 Operator stated the other operator told them to take over the controls of TR06 while they helped the other crew. TR06 Operator stated they went through their checklist to make sure everything was in order on TR06 before operating it. The last time TR06 Operator operated a TRIPP machine was about a month ago. TR06 Operator stated the training for the equipment is a bundle training on four different machines and they completed the training in June of 2021. TR06 Operator stated they did not feel the training is adequate before operating the units in the field. TR06 Operator mentioned there needs to be more emphasis on the operations of the units and not just completing the written examination at the end of training. TR06 Operator reported having little practical experience operating the TR06 machine. TR06 Operator stated they were not that familiar with working in Shady Grove Yard, and this was their first time working there. TR06 Operator stated there is an Enable button on the console that you must select after switching operating sides. TR06 Operator stated if you do not select the button, then the control arm does not switch and operates in reverse of what you are trying to do. TR06 Operator stated they were trying to retract the arm on TR06 when the arm extended instead, damaging the A99-146 signal. TR06 Operator stated the equipment should have some type of safety device or sticker on the console to emphasize the importance of making sure the button is enabled so the controls operate as intended. TR06 Operator stated that they believe the training does not thoroughly cover the importance of making sure this button is enabled when switching operating sides on the units. TR06 Operator stated it is incumbent upon the equipment operators to operate the TRIPP Machines on their own to better familiarize themselves with the units. TR06 Operator gave some examples of similar situations that happened with coworkers that went unreported. TR06 Operator stated the operation time of the TRIPP Machine is unevenly distributed amongst the equipment operators, which prevents all of the operators becoming proficient with the machines. TR06 Operator admitted to making a mistake while operating the unit that caused the damage to the signal.

Appendix B – Photographs




Figure 1: This image shows A99-146 signal's resting position after being hit by TR06.



Figure 2: This image shows the base of A99-146 signal, which will need to be completely replaced.


Appendix C – Work Order



Washington Metropolitan Area Transit Authority
Maintenance and Material Management System
Work Order Details

Page 1 of 1
MX76PROD

Work Order #: 16703323
Type: CM



Status: INPRG
11/15/2021 20:52

Work Description: A99, BROKEN SIGNAL POLE 146 ON TRACK 5
Job Plan Description:

Work Information									
Asset: ATCSA99		ATCS, TRAIN CONTROL ROOM, YARD, VIRTUAL ITEM FOR MAXIMO EQUIPMENT		Owning Office: ATCS-TSSM		Parent:			
Asset Tag: ATCSA99				Maintenance Office: ATCS-TSSM-ARFO		Create Date: 11/15/2021 16:11			
Asset S/N: TCRA99				Labor Group: ATCSD1A99		Actual Start: 11/15/2021 20:52			
Location: 10726		A90, SHADY GROVE YARD, BUILDING (C) S&I, 1ST FLOOR, TRAIN CONTROL ROOM (A99 TCR1)		Crew:		Actual Comp:			
Work Location:				Lead:		Item: ATCSV9925			
Failure Class: ATCS013		SIGNALS / SIGNS		GL Account: WMATA-02-33530-50499270-042-*****-OPR**		Target Start:			
Problem Code: 2671		PHYSICAL DAMAGE		Supervisor:		Target Comp:			
Requested By: [REDACTED]				Requestor Phone:		Scheduled Start:			
Chain Mark Start:				Chain Mark End:					
Create-Mileage: 0.0				Complete-Mileage: 0.0					

Task IDs

Task ID	Description
10	Investigate A99 146 Signal

A99 crew found that A99 146 Signal had been knocked down. We disconnected the wiring, taped the ends and wrapped them up. The broken parts are located at TCR #2, outside. The foundation base was destroyed and will need to be replaced along with the mounting flange, the pole, and the Signal Head. The wiring itself appears to be okay.

Component:	Work Accomplished:	Reason:	Status:	Position:	Warranty?:				
Actual Labor									
Task ID	Labor	Start Date	End Date	Start Time	End Time	Approved?	Regular Hours	Premium Hours	Line Cost
	[REDACTED]	11/15/2021	11/15/2021	16:00	17:30	N	01:30	00:00	\$49.20
	[REDACTED]	11/15/2021	11/15/2021	16:00	17:30	N	01:30	00:00	\$49.94
	[REDACTED]	11/15/2021	11/15/2021	16:00	17:30	N	01:30	00:00	\$64.19
Total Actual Hour/Labor:							04:30	00:00	\$163.34

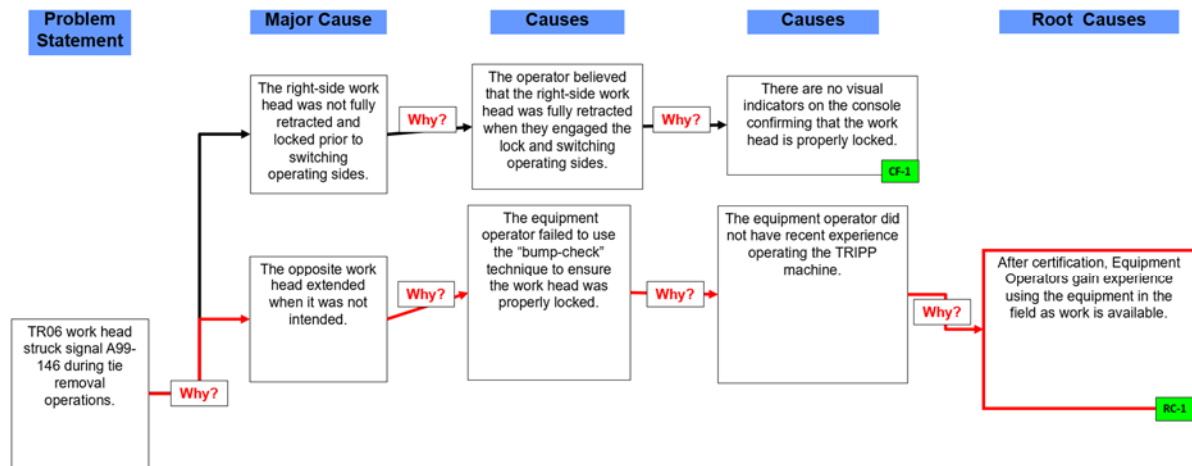
Failure Reporting

Cause	Remedy	Supervisor	Remark Date
Remarks:			

WT_plust_woprint.rptdesign
11/16/2021 07:09

*Figure 3: ATCM Work Order for broken signal and base.

Appendix D - Root Cause Analysis



Root Cause Analysis

