



WMSC Commissioner Brief: W-0095 – Derailment – Arlington Cemetery Station – March 26, 2021

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

Safety event summary:

A flatcar derailed near Arlington Cemetery Station as it moved through a switch. The flatcar was one of three being backed through a switch by a hi-rail vehicle that was being operated by a Metrorail contractor working for Kiewit.

Kiewit did not maintain the integrity of the safety event scene, and a Kiewit Superintendent notified Metrorail's Safety Department of the derailment only after the Kiewit had placed the flatcar back on the rails using an excavator. The Superintendent had been directing the Hi-Rail Vehicle Operator, with two other contractors serving as spotters. The Superintendent directed the Hi-Rail Vehicle Operator to re-rail the flatcar, and did not immediately remove themselves and the operator from service. In an interview, the Hi-Rail Vehicle Operator and Superintendent stated they were not aware of accident reporting procedures or the need to preserve an accident scene.

The flatcars were being moved with their tailgates down. A move permit required the tailgates of carts to be lifted before movement. It appears the flatcars were moved with the tailgates down in order to save time, despite the safety risks posed by such a move. The crew was performing maintenance activities for a subcontractor at the time of the derailment. The Hi-Rail Vehicle Operator is a crane operator by certification who Kiewit had been using as a hi-rail operator for approximately three years.

Metrorail had inspected and approved the Hi-Rail Vehicle for use through August 31, 2021. Metrorail provided documentation that the flatcars had been approved for use through June 30, 2021.

Kiewit stated that the first flatcar crossed from Track 2 to Track 1, but one wheel of the second flatcar derailed as it passed the switch point.

At the time, there was no train traffic in this area and third rail power was properly de-energized on both tracks for a long-term shutdown of the Blue Line. The primary purpose of the work zone was to rebuild the platforms at Arlington Cemetery Station, with other ancillary work also scheduled. Metrorail termed this shutdown area an "Authorized Construction Site" (ACS), where Metrorail gives a contractor additional day-to-day authority, and there is a significantly smaller presence of Metrorail employees than would be required under Metrorail's regular roadway worker protection procedures.

Metrorail did not document the communications related to this work, and allowed radio communications to be conducted outside of the WMATA radio network without recordings. CCTV video was not available at this location during this event due to the systems being offline during the station rehabilitation project.

The Hi-Rail Vehicle Operator and the Superintendent were tested for drugs and alcohol, but were allowed to continue to work while the results were pending.



Probable Cause:

The probable cause of this event was Metrorail's lack of and ineffective safety oversight of contractors, Metrorail's lack of communication to ensure all employees and contractors in the Metrorail system are aware of and implement safety procedures (including as they relate to operations and to the integrity of safety event investigations), the contractor's failure to follow approved work procedures, and the contractor's lack of effective supervisory oversight to ensure effective safety procedures and radio communication. Contributing to the challenges of developing other effective mitigations, Kiewit did not follow safety investigation and reporting requirements.

Corrective Actions:

Metrorail directed Kiewit to conduct a safety stand-down and to share lessons learned related to proper procedures for hi-rail vehicle movements.

Metrorail directed Kiewit to comply with drug and alcohol requirements that any person required to be tested for drug and alcohol due to a safety-event is removed from service until the results are received.

Metrorail directed Kiewit to inform all personnel of safety investigation roles and responsibilities.

WMSC staff observations:

Metrorail was required to implement updated approval processes for RMMs to be used in the WMATA Rail System through corrective action plans developed to address findings in the WMSC's RMM Audit earlier this year.

The WMSC has emphasized to Metrorail that, regardless of any WMATA designation such as an ACS, Metrorail is responsible for safety within the WMATA Rail System. This includes ensuring that safety requirements are included in contracts, that there are adequate WMATA personnel in the field ensuring compliance with permitting and procedures, that radio communication is carried out properly, and that these safety aspects are carried through to all contractor construction areas in the future.

Staff recommendation: Adopt final report.



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

FINAL REPORT OF INVESTIGATION A&I E21122

Date of Event:	03/26/2021
Type of Event:	Derailment
Incident Time:	13:20 hours
Location:	Arlington Cemetery Station, Track 2
Time and How received by SAFE:	14:16 hours, Email
WMSC Notification Time:	15:08 hours, Email
Responding Safety Officers:	WMATA: No WMSC: No Other: No
Rail Vehicle:	CR4731-CR7727-CR7734-CR7740
Injuries:	None
Damage:	None
SMS I/A Incident Number:	20210329#92529

Arlington Cemetery Station – Derailment

March 26, 2021

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Abbreviations and Acronyms

ACS	Authorized Construction Site
CAP	Corrective Action Plan
CCTV	Closed-Circuit Television
CTEM	Car Track Equipment Maintenance
I/A	Incidents/Accidents
MSRPH	Metrorail Safety Rules and Procedures Handbook
NOAA	National Oceanic and Atmospheric Administration
SAFE	Department of Safety and Environmental Management
SMS	Safety Measurement System
WMATA	Washington Metropolitan Area Transit Authority
WMSC	Washington Metrorail Safety Commission

Executive Summary

On Friday, March 26, 2021, at approximately 13:20 hours, a Kiewit Contractor operating Hi-Rail Vehicle CR4731 (pulling CR7727, CR7734 and CR7740) near Arlington Cemetery Station, Track 2, derailed the front right wheel of CR4731 as they were moving through a switch from Track 2 to Track 1 within the Authorized Construction Site (ACS). The Kiewit Superintendent on site notified SAFE of the derailment only after the flatcar had been placed back on the rails. The Hi-Rail Vehicle Operator utilized an excavator for lifting the flatcar's end and set the wheels back on the track. There were no reported injuries or major damage as a result of this accident. The Hi-Rail Vehicle Operator and Superintendent underwent post-incident toxicology testing; however, Kiewit did not remove personnel from service.

During the move, the Superintendent was directing the Hi-Rail Vehicle Operator, and two additional contractors were performing spotter duties. The flatcars were reported to have the tailgates in the down position as the move occurred. The vehicles were moving at a slow speed through the switch point. The first flatcar was reported to have successfully passed through the switch point onto Track 1. The wheel of the second flatcar derailed as it traversed the switch point. The Superintendent halted the operations after the derailment to investigate.

The derailment's probable cause was a failure to follow the approved work procedure by not lifting the carts' tailgates before movement by the Hi-Rail Vehicle Operator. Contributing to the derailment was improper decision-making caused by the Superintendent not consulting with management before changing the work procedure.

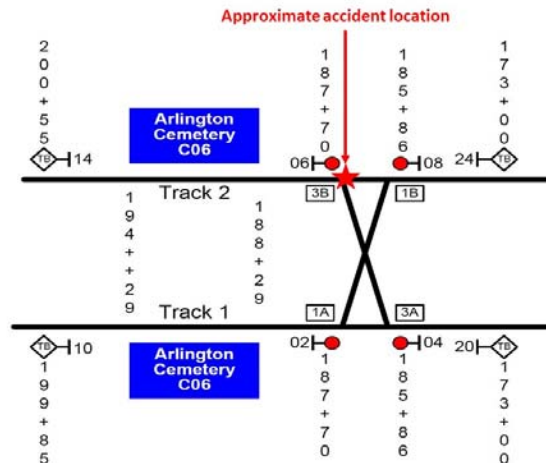
Based on an analysis of data collected, review of submitted documentation, and formal interviews with Kiewit personnel, the following findings were identified:

- The Hi-Rail Vehicle Operator did not follow the Hi-Rail Move Permit Procedure, which required the tailgates of carts to be lifted before movement.
- The Superintendent did not direct the Hi-Rail Vehicle Operator to follow the approved Hi-Rail Move Permit Procedure, which required the tailgates of all carts to be lifted before movement.

Incident Site

Arlington Cemetery Station, Track 2

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.

Investigative Methods

The investigative methodologies included the following:

- Physical Site Assessment
- Formal Interviews – SAFE interviewed two individuals as part of this investigation. Interviews include persons present at, during, and after the incident, those directly involved in the response process, and representatives from the Washington Metrorail Safety Commission (WMSC). SAFE interviewed the following Kiewit personnel:
 - Hi-Rail Vehicle Operator
 - Superintendent
- Documentation Review – Collection of relevant work history information and process documentation contained in WMATA systems of record. These records include:
 - Hi-Rail Vehicle Operator Witness Statement
 - Hi-Rail Vehicle Operator Training
 - Superintendent Witness Statement
 - Superintendent Site Training
 - WMATA Station Rehab 3 Safety Management Plan
 - Kiewit On-Rail Safety Plan
 - Hi-Rail Move Permit Procedure
 - Kiewit Incident Alert
 - Metrorail Safety Rules and Procedures Handbook (MSRPH)
 - National Oceanic and Atmospheric Administration (NOAA)
 - Maximo Data

***Note: Closed-Circuit Television (CCTV) was not available due to ACS construction at Arlington Cemetery Station. In addition, the Audio Recording System (ARS) was not available due to radio communications being conducted outside of the WMATA radio network.*

Investigation

Based on findings, at approximately 13:20 hours, a Kiewit Contractor operating Hi-Rail Vehicle CR4731 near Arlington Cemetery Station, Track 2, derailed the front right wheel of CR4731 as they were moving through a switch from Track 2 to Track 1 within the ACS. The Hi-Rail Vehicle Operator was attempting to move a total of three flatcars [CR7727-CR7734-CR7740] to position maintenance equipment on Track 1. During the move, the Superintendent was directing the Hi-Rail Vehicle Operator, and two additional contractors were performing spotter duties. The flatcars were reported to have the tailgates in the down position as the move occurred. The vehicles were moving at a slow speed through the switch point. The first flatcar was reported to have successfully passed through the switch point onto Track 1. The wheel of the second flatcar derailed as it traversed the switch point. The Superintendent halted the operations after the derailment to investigate.

The Superintendent directed the Hi-Rail Vehicle Operator to utilize an excavator to re-rail the flatcar. After the flatcar was re-railed, the Superintendent contacted and notified SAFE of the derailment. The Hi-Rail Vehicle Operator and Superintendent conducted post-incident testing and returned to work before the test results were completed. There were no reported injuries or damages as a result of this accident.

Car Track Equipment Maintenance (CTEM)

CTEM personnel performed the necessary safety inspection for Hi-Rail Vehicle CR4731 on February 25, 2021, and approved the equipment for use on the roadway. The current safety inspection sticker expires on August 31, 2021. CR7734, CR7727 and CR7740 have all been inspected with current inspection stickers that expire on July 31, 2021.

Interview Findings

Based on the investigation launched into the derailment within the ACS at Arlington Cemetery Station, SAFE conducted two separate formal interviews with the Vehicle Operator and Superintendent via Microsoft Teams, which included the investigation team, relevant Metro personnel and representatives from the WMSC. The interview conducted identified the following key findings associated with this event:

The Vehicle Operator reported they were instructed by the Superintendent to re-rail the accident vehicle. The Vehicle Operator also stated they were not aware of the accident reporting procedures, which included preserving the scene after an accident.

The Superintendent reported they instructed the Vehicle Operator to traverse the Hi-Rail Vehicle from Track 2 to Track 1 with the tailgates in the down position. The Superintendent added they were not aware of the accident reporting procedure prior to this accident occurring.

Weather

At the time of the incident, NOAA recorded the temperature at 82° F, wind 23 mph, passing clouds with visibility of 10 miles. Based on findings, SAFE has concluded that weather was not a contributing factor in this incident (Weather source: NOAA – Location: Arlington, VA.)

Human Factors

Fatigue

Vehicle Operator

Evidence of Fatigue

The incident data was evaluated for evidence of fatigue that may have been present at the time of the incident. No evidence of fatigue was detected from the available data. The Vehicle Operator reported feeling fully alert at the time of the incident. The Vehicle Operator reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

The incident data was evaluated 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. The Vehicle Operator did not report any variation in the sleep schedule in the days leading up to the incident. The employee worked the day shift in the days leading up to the incident. The Vehicle Operator was awake for nine hours at the time of the incident. The Vehicle Operator reported seven hours of sleep in the 24 hours preceding the incident. The off-duty period was 14 hours which provides an opportunity for 7-9 hours of sleep. This was a comparable amount to the Vehicle Operator's usual workday sleep durations. The Vehicle Operator reported no issues with sleep.

Superintendent

Evidence of Fatigue

The incident data was evaluated for evidence of fatigue that may have been present at the time of the incident. No evidence of fatigue was detected from the available data. The Superintendent reported feeling fully alert at the time of the incident. The Superintendent reported experiencing no symptoms of fatigue in the time leading up to the incident.

Fatigue Risk

The incident data was evaluated 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. The Superintendent reported keeping a regular sleep schedule in the days leading up to the incident. The Superintendent performed consistent shifts (6a-6p) leading up to the incident, which permitted adequate sleep throughout the week. The Superintendent was awake for nine hours at the time of the incident. The Superintendent reported seven hours of sleep in the 24 hours preceding the incident. The off-duty period preceding the incident was 10 hours long. This was a comparable amount to the Superintendent's usual workday sleep durations. The Superintendent reported no issues with sleep.

Since fatigue evidence and risk factors were not present for both contractors, the biomathematical fatigue modeling application (SAFTE-FAST Web SFC) was not applied for the Vehicle Operator or Superintendent.

Post-Incident Toxicology Testing

WMATA's Drug and Alcohol Program determined that the Vehicle Operator and Superintendent were not in violation of the Drug and Alcohol Policy and Testing Program 7.7.3/6.

Findings

- The Hi-Rail Vehicle Operator did not follow the Hi-Rail Move Permit Procedure, which required the tailgates of carts to be lifted before movement.
- The derailment occurred within an ACS.
- The Superintendent did not direct the Hi-Rail Vehicle Operator to follow the approved Hi-Rail Move Permit Procedure, which required the tailgates of carts to be lifted before movement. (When tailgates are down are traveling through a switch area, the carts may bunch up and cause the wheels to derail from the track).
- Vehicle Operator and Superintendent resumed work before post-incident test results were returned.
- The incident was not immediately reported, and Kiewit personnel re-railed the flatcar before WMATA was able to conduct an on-site investigation.

Immediate Mitigation to Prevent Recurrence

- Kiewit immediately halted work operations.
- Kiewit lifted Tailgates on all carts.

Probable Cause Statement

The derailment's primary probable cause was the failure to follow the approved work procedure by not lifting the carts' tailgates before the Vehicle Operator moved the Hi-Rail Vehicle. Contributing to the derailment was improper decision-making caused by the Superintendent not consulting with management before changing the work procedure. An additional finding was discovered upon investigating this accident which revealed that appropriate accident reporting procedures were not followed. The incident vehicle was re-railed prior to a safety investigation being conducted.

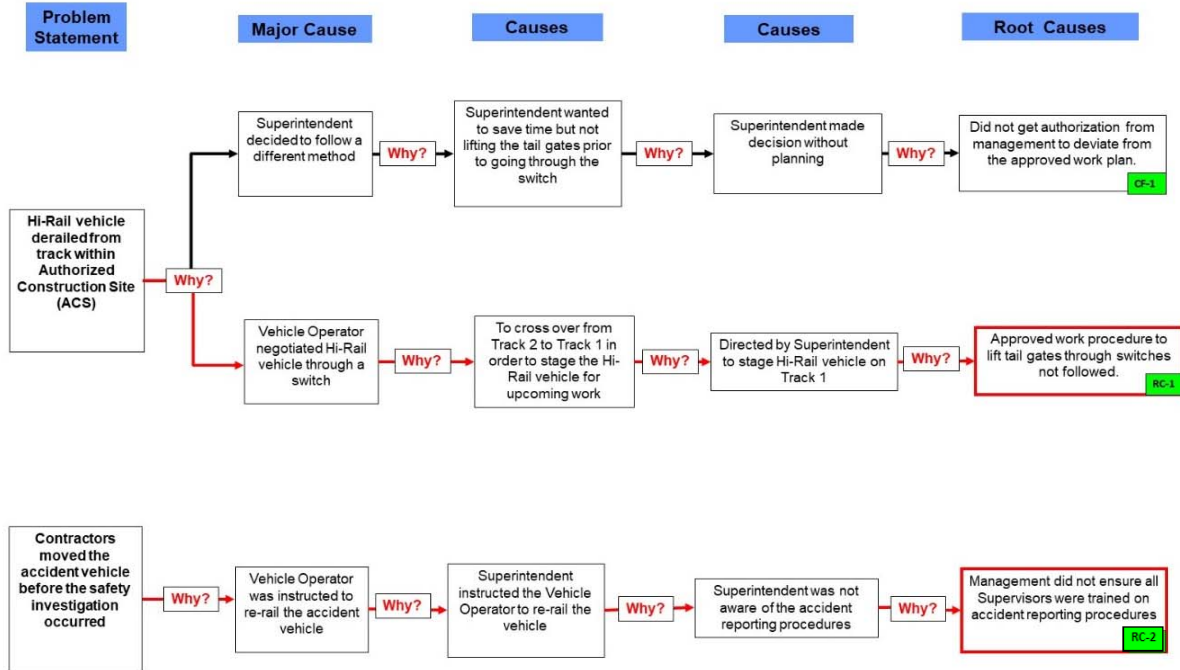
SAFE Recommendations/Corrective Actions

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, and the respective departmental Safety Risk Coordinator (SRC) will manage the mitigation. Refer to the SMS I/A Module for additional information.

Corrective Action Code	Description	Responsible Party	Due Date
92529_SAFE CAPS_PICO_ 001	(RC-1, CF-1) Office of Capital Delivery - Project Implementation and Construction (PICO) will ensure Kiewit Management conducts a safety stand-down/ lessons learned sessions for equipment operators focusing on proper procedures for Hi-Rail Vehicle movements.	CAPD SRC	5/1/2021
92529_SAFE CAPS_PICO_ 002	(RC-2) PICO will ensure Kiewit Management removes contractor/subcontractor personnel from service for safety incident-related post-incident testing and holds them off until testing results are received.	CAPD SRC	7/1/2021

92529_SAFE CAPS_PICO_ 003	(RC-2) PICO will ensure Kiewit Management informs all contractor/subcontractor personnel of the investigation content provided in SB#20-12 : Safety Investigation Roles and Responsibilities.	CAPD SRC	7/1/2021
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Appendix A - Root Cause Analysis



Appendix B – Interview Summaries

Hi-Rail Vehicle Operator

This employee is a Kiewit Contractor with three years of service with Kiewit. The Operator has ten years of experience as a Crane Operator. The Operator's last crane certification was in September 2020, and they have no history of sleep issues to report. The Operator was trained on the operation of Hi-Rail Vehicles and Equipment on February 10, 2021 and is currently RWP Level 1 qualified with an expiration of July 2021.

Based on the SAFE interview, the Operator reported they were backing the Hi-Rail Vehicle through switches at Arlington Cemetery Station from Track 2 to Track 1. They stated they have three years of experience operating Hi-Rail Vehicles while working for Kiewit. The Operator said the vehicle did not have any mechanical problems, and there were no distractions present. The Operator reported they think the tailgate being lowered on the flatcar contributed to the derailment. As they were moving the vehicles, the Operator said they had ground guides, and the Superintendent was present. They stated they were traveling under 2 mph while having spotters observing. After the flatcar derailed, the Operator used the excavator to lift the flatcar back onto the tracks per the Superintendent's directions. The Operator stated the Superintendent permitted them to proceed with moving the flatcar back onto the rail. The Operator reported that putting the tailgate in the upright position could have prevented the derailment from occurring. The Operator stated they did not report the derailment due to the Superintendent being present on the scene when the event occurred.

Superintendent

This employee is a Kiewit Superintendent with two years of service with Kiewit and 25 years of experience as a Superintendent. The Superintendent had no history of sleep issues to report. The Superintendent is currently RWP Level 1 qualified with an expiration of July 2021.

Based on the SAFE interview, the Superintendent reported they watched the rail vehicles travel through the first part of the switch when the derailment occurred. At the time of the accident, the work crew was performing maintenance activities for subcontractors present at the site. The Superintendent stated a Job Safety Briefing was conducted before work started, and the only concern was watching the tailgates of the flatcar as they traveled through the switch. To mitigate this risk, the Superintendent stated they directed the Operator to travel under 2 mph. The Superintendent reported there were no distractions present, and they think having the tailgates in the down position contributed to the derailment occurring. They also added that having the tailgates in the upright position and better radio communication may have prevented this accident. The Superintendent stated they were unaware of accident reporting procedures that required rail vehicles involved in an accident or incident not to be moved. The Superintendent reported after they conducted post-incident testing, they return to work while the results were pending.

Appendix C – Derailment Photos



Photo 1: Wheel of flatcar derailed from the track.



Photo 2: Wheel of flatcar derailed from the track.



Photo 3: Flatcars with the tailgate down. Flatcar tailgates were in this position while traversing the switch from Track 2 to Track 1.



Photo 4: Switch located near Arlington Cemetery Station.



Photo 5: Damage to the tailgate as the result of the flatcar derailing. Total damages are currently pending.



Photo 6: View of the consist.

Appendix D – Training Roster

Talent Development "Build Your Legacy"
TRAINING ATTENDANCE SHEET

Title of Training Course: Track Work Safety
 Location of Training: Arlington Station
 Date of Training: 3/27/2021
 Instructor(s)/Facilitator(s): [Redacted]
 Description of topics covered and materials used: _____
 See attached agenda, if applicable

EMPLOYEE'S ACKNOWLEDGEMENT:
 This is to acknowledge that I have received the training & materials as defined above.

Employee name including suffix (Sr., Jr., etc.)						
S#	First (Print)	Last (Print)	PERNER #	Company	Craft	Employee Signature
	[Redacted]	[Redacted]	[Redacted]	Kiewit	PM	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	PE	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Eng'r	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Supt	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Engineer	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Foreman	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	OE	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	OE	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Sep	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Rickard	L.F	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Safety	[Redacted]
	[Redacted]	[Redacted]	[Redacted]	Kiewit	Operator	[Redacted]

Instructor/Facilitator's Signature: [Redacted] Date: 3/27/2021

Document 2: Kiewit Safety Stand-down Roster.

Appendix E – Hi-Rail Vehicle Training Documentation

Designated Operator Check-Off Sheet Light Duty HIRAIL-14-00-24/11/2/2019

Designated Operator Check-Off

Date: 2/10/21

Location: WMATA 3 104648

- Employee Has Reviewed and Understands Kiewit Guidelines For Operation Of Hirail Equipment
- If this is a Commercial Motor Vehicle, is the Employee properly signed up in our DOT Compliance Program?
- Review Cab and Chassis Operation (Transmission, Seat Adjustment, Gauges, Switches, Brakes- Air-Brake Endorsement if required, Oil Levels, Tires, Lights, etc.)
- Employee Understands and has Performed a Daily Visual Inspection of this Machine.(DOT Requirement for Cab& Chassis, OSHA/ANSI Requirement for Aerial Lift, Boom, etc... Procedure for turning in report)
- Employee Understands Capabilities / Capacities and Operation of All Components of the Truck/ And Attachments
- Employee Has Reviewed and Understands the Operator's Manual(s) for this Machine (This manual(s) must stay in the truck at all times)
- Employee Understands the Operation, Capabilities, and Inspection of the Hirail Gear
- Employee Demonstrated the Ability to Properly and Safely Operate the machine

I understand that I am responsible for the safe operation of the machine and all of its attachments I have been designated to operate.

Employee's Name: _____

(Print)

(Signature)

Company Representative: _____

(Print)

(Signature)

All forms must be completed and signed by a designated trainer and sent to the Kiewit site equipment manager.

Document 3: Kiewit Hi-Rail Vehicle Operator training documentation.