National Transportation Safety Board
Office of Railroad, Pipeline and Hazardous Materials Investigations
Railroad Division
Washington, D.C. 20594

Survival Factors

Group Chairman's Factual Report of the Investigation

Report Date: April 14, 2022

A. Accident Information

NTSB Accident Number:	RRD22LR003
Date of Accident:	December 8, 2021
Time of Accident:	11:20 a.m. (Local time)
Equipment:	Spiker Machine #2
Operator:	Norfolk Southern Railway Company
Employee:	National Salvage and Service Corporation
Injuries:	1 Fatality Contract worker
Location of Accident:	Main track 1 NS Buffalo Line BR Milepost 295.1

B. Investigative Group Members

Sheryl Harley, Investigator
NTSB Group Chairman

C. Accident Summary

On December 8, 2021, at about 11:20 a.m. local time, a Norfolk Southern work gang was operating on the NS Main track 1 Buffalo Line at Milepost 295.1 in Reed, Pennsylvania. Three NS spike machines were working from north to south. The operator of the second machine, Spiker 2, observed that he had closed the gap between his equipment and Spiker 1 and decided to back up to assist Spiker 3. The operator of Spiker 2 reversed direction and backed over the National Salvage employee. The employee was assigned to work with the NS gang that was replacing track. The National Salvage employee was marking rail to be removed and collected by other members of the work gang positioned behind Spiker 3. Spiker 2 came to a stop on top of the employee and a crane was used to lift the equipment up to extricate the injured worker. The employee sustained fatal injuries in the accident.

Preliminary information indicated that the employee was standing within the gage of the track at the time of the accident. The operator of Spiker 2 advised that he did not see the employee prior to initiating the reverse movement or during the movement.

D. Accident Location

The accident occurred on the Norfolk Southern Buffalo Line Main Track 1 which runs in a north-south direction with a siding located on the east side of the main track near the elevated state roadway, Highway 147 also known as South River Road. The location is in a rural, wooded area adjacent to the Susquehanna River on the west side. Accessibility to the site is limited to an accessway constructed of loose ballast on top of dirt. **Figure 1** is a Google Earth aerial view of the accident scene. The red arrow indicates the approximate location of the point of contact between the equipment and the worker.

Figure 1 Google Earth aerial view of the accident site. (Source: Google)

E. Details of the Survival Factors Investigation

The Survival Factors investigation focused on the circumstances of the accident that resulted in the injury to the employee. The investigation examined the worker's use of personal protective equipment (PPE), its compliance with current standards and its effectiveness. In addition, the investigation examined the work environment, to include the walking conditions, and the presence of any hazards that may have contributed to the accident. A review of the railroad's history of employee injuries related to the track environment was also completed. Lastly, the

investigation examined the emergency response, to include the timeliness, effectiveness and efficiency of the operation, emergency responder training in rail related emergencies and difficulties encountered during the extrication phase of the operation.

For the purposes of this report, references to the left side refer to the spiker machine operator's position when facing southward.

1. The Accident Equipment- Spiker #2

The accident spike machine was 25 feet 8 inches in length, 8 feet 6 inches in width and was 9 feet 10 inches in height. The equipment weighed 32,000 pounds. Spiker #2 was equipment with change of direction warning alerts, spot lights as well as flashing lights and warning signage to remind workers of the minimum stand off distance from the equipment and the sightline limitation of the operator. *(For more information see the Mechanical Group and Human Performance System Safety group chairmen reports).*

During the on-scene investigation, the accident spiker machine was examined for evidence related to the worker's point of contact with the equipment and the directionality of the worker's body as it traveled underneath the equipment. **Figure 2** is a photograph of Spiker #2 at its final rest position on the scene.

Figure 2 Looking southward down main track one at the rear of Spiker #2 at final rest on the scene. Spiker #1 is seen in the background. (Source: NTSB)

2. Worker Injury and Safety Equipment

2.1 Worker Injury Causation

The fatally injured worker was identified as a 27-year-old male employed by National Salvage. At the time of the accident, the worker was standing within the gage of the track when the operator of Spiker #2 reversed direction and while traveling northward struck the worker. Investigators on the scene determined that the machine continued northward, finally stopping 34 feet 10 inches from the initial point of contact. Measured from the rear of Spiker #2, the worker had traveled approximately 12 feet 2 inches underneath the equipment as it reversed over him. **Figure 3** is a graphic of the accident showing the final rest position of the worker.

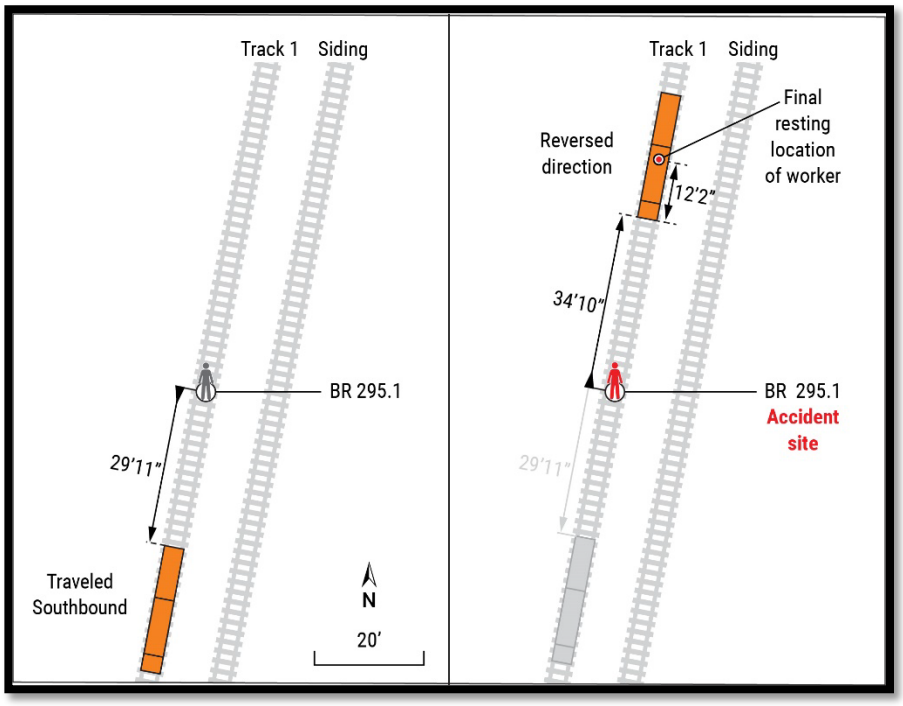

Figure 3 Graphic of accident scenario showing distances traveled by both equipment and worker and the final rest position of both. (Source: NTSB)

Additional measurement taken by investigators on the scene found that 11 feet 7 inches from the rear of the machine, biological material was found under the equipment on the main frame and the solid hydraulic line located in front of the turntable cylinder which showed contact with the worker's head. Green paint, from a spray can carried by the worker on his utility belt, exploded during the impact with the spiker machine and was found spattered and smeared on the underside of Spiker #2. Additional paint was found on the front and bottom portion of the black backpack worn by the worker, which was the likely source of the paint transfer from the worker's person to

the spike machine. The directionality of the paint, found under the machine, matches the movements of the worker underneath the equipment. Measurements taken underneath the equipment showed that its highest point, the clearance underneath the machine between it and the track bed was only 17 inches. The solid hydraulic line was found to be only 15 inches above the track surface. The location of the frame and the hydraulic line was 40 inches inward from the outside edge of the equipment. **Figure 4** Photograph of the state police paint mark (circled in yellow) documenting the final rest location of the worker under the machine at final rest.

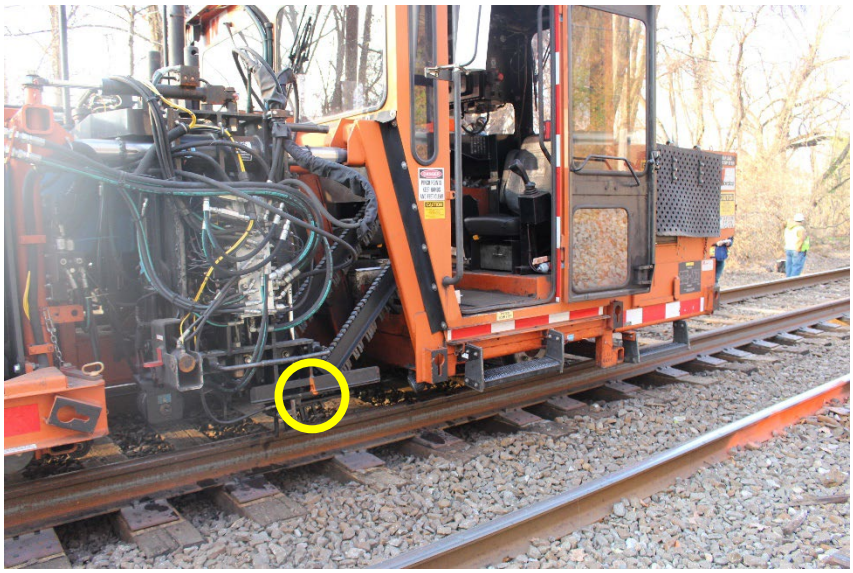

Figure 4 A photograph taken from the left side of the equipment showing distance traveled by the worker underneath the equipment and his final rest location circled in yellow. (Source: NTSB)

2.2 Worker Personal Protective Equipment (PPE)

At the time the worker was transferred to the Dauphin County Coroner's Office, he was wearing a black hooded coat with reflective tape on the front, back and on the sleeves. The coat was decorated with flag motif on the front and the back in fluorescent yellow. The employee was wearing a black backpack which was recovered on the scene and was found to obscure the reflective material on the back of the coat. The worker was wearing black insulated pants with one reflective band around each leg and a pair of knee guards. Also recovered was the worker's hard hat and portable radio. On scene, additional equipment was found to include the hard hat light, which was normally attached by Velcro to the hard hat. The light was tested and found to be operational in all phases. Also located on the scene near the final rest position of the worker's head were ear plugs, two pairs of safety glasses; one that was broken and showed evidence of impact and containing a significant amount of blood and indications of wear. The black backpack which was wedged under Spiker #2 was eventually recovered and inventoried. The contents included food items, an additional lightweight jacket, work gloves and a notebook. The black backpack had

no reflective material on it. The worker's cellphone was found amongst the property held at the coroner's office.

The worker's clothing was recovered and examined to determine compliance with the railroad and the industry's safety standards. The worker's outer wear includes a customized black coat with reflective stripping consisting of one two-inch band around the chest, two bands around the arms and a band that extended up from the chest band, crossed over the tops of the shoulders and continued down the back on each side. The lower portion of the garment was a stylized American Flag in florescent yellow reflective material. The interior of the coat was a florescent yellow color with a gray hood attached. The worker wore a pair of insulated coveralls, black in color, with one two-inch reflective band around the lower portion of each leg. The worker also wore a long sleeve, florescent yellow Tee-shirt. The shirt contained a two-inch reflective band that encompassed the torso and crossed over top of the shoulders on each side. **Figure 5** is a photograph, taken from the manufacturer's website, showing an exemplar coat, insulated pants and shirt worn by the worker at the time of the accident. It was noted by the coroner's office, the Pennsylvania State Police and the first arriving EMT, that the yellow work shirt was found underneath the coat.

Figure 5 Photograph of examples of the PPE worn by the worker at the time of the accident. (Source: Safety Shirtz, Viking Wear and Artic Quest Hi-Viz websites)

3. Safety Standards

3.1 American National Standards Institute (ANSI) Class Standards

ANSI established standards for reflective clothing in 1999 and revised the standard in 2010. The standard sets voluntary guidelines for high visibility clothing divided into three classes. Each class specifies the minimum size of background color, reflectivity, and placement of reflective material.

ANSI Class I garments offer the least amount of high visibility performance. Class 1 garments are intended for those working in low-impact areas where traffic flow does not exceed 25 miles per hour, the worker is able to stand far away from any potential injury hazard, and the work area is not considered a complex environment. Typically, the users of Class 1 are parking lot attendants, delivery drivers, or warehouse workers. The required dimension of the reflective tape is less than that for an ANSI Class 2 garment, to include only 155 square inches of tape that can be 6.46 linear feet of 2-inch tape or 9.39 linear feet of 1 3/8-inch tape.

ANSI Class II garments are intended for use in activities where greater visibility is necessary during inclement weather, or in environment with risks that exceed those for Class 1. Garments in this class are used by workers who perform tasks that divert attention to approaching traffic or place the worker near passing vehicles traveling at 25 miles per hour or more. Railway workers is just one of the professions that according to the ANSI standard require a Class 2 garment. The standard outlines the composition of the garment to include the requirement for a full jacket with a hood and sleeves. The background should consist of a fluorescent color that stands out conspicuously but is not required to be reflective. The standard suggests that the fluorescent color be yellow/green, orange/red, or fluorescent red. The colors must contrast with the environment and any vehicle or machinery present. The garment must have a minimum of 201 square inches of retro-reflective material to include 8.373 linear feet of 2-inch tape or 12.2 linear feet of 1 3/8 inch of reflective tape. Reflective material must be 1.375 inches in width for every 4 yards of material or 2 inches in width for 2.8 yards of material. At least one reflective band must encircle the torso providing 360-degree visibility. Reflective bands must be separated by at least two inches. A two-inch reflective band between the elbow and shoulder on the sleeve with another 2 or more-inch band located from the cuff. **Figure 6** is a photograph showing the ANSI certified version of the coat worn by the worker.

Figure 6 Photograph of the ANSI Certified versions of the coat worn by the worker. (Source: Safety Shirtz website)

3.2 National Salvage, PPE Policy

Investigators inquired about the worker's PPE to representatives from National Salvage. A representative advised that the worker was not wearing the company issued PPE. National Salvage provides its workers with a solid yellow/green, fluorescent safety vest, along with a hard hat with reflective strips and the company logo. The company also provides its employees with a credit card to purchase the necessary equipment such as gloves, safety glasses and the like. National Salvage does not inspect employees purchases of PPE on the company credit card to ensure compliance with safety regulations. The company conducted safety inspections on the accident worker on January 19, 2021, and February 23, 2021, at his job site. The safety checklist, completed by the company's safety manager, shows that the worker's PPE was checked and found in compliance with the safety rules. During the interview with the safety manager, the manager acknowledged that he had to counsel the worker on one occasion for his failure to keep his safety glasses in place. However, he has never counseled the worker regarding his PPE compliance with company regulations.

National Salvage employees are required to conform to the regulatory requirements of the railroad gang they are currently contracted to work with. National Salvage provided investigators with a copy of the PPE regulatory requirements of every railroad that the industry provides services to.[1] The document shows that National Salvage was informed by Norfolk Southern that the minimum PPE standard for all workers and contractors is ANSI Class 2.

[1] See Survival Factors Attachment- National Salvage PPE Policy and Worker Inspections

3.3 Norfolk Southern Railway Company Safety Rule 1044

Norfolk Southern established a standard for PPE as part of their worker safety program. NS Safety Rule 1044 outlines the requirement for worker and contractor PPE use. The railroad's latest version of the Work Site Safety Requirements was published and became effective on May 1, 2020 and provides the standards for the Personal Protective Equipment that must be worn by contractors while on Norfolk Southern property. NS requires the American National Standards Institute (ANSI) Class 2 reflective exterior clothing or safety vests, hard hats, knee guards, appropriate gloves, and safety glasses to be worn by contractors. In addition, NS PPE policy states that the required PPE must be worn as the outer or top garment.[2]

3.4 Worker Compliance

As part of the investigation into the circumstances surrounding the accident, investigators examined the deceased worker's compliance with safety regulations stipulated by both his employer, National Salvage, and the railroad, Norfolk Southern on whose property he was working. Investigators attempted to rule out the possibility that the worker by accident, mistake or unknowingly acquired garments that were not in compliance with the PPE safety regulations. The investigation into worker compliance with the safety rules required further examination of the PPE worn by the worker at the time of accident. The investigation was able to rule out the following items.

- Rule Out #1

The first issue that investigators needed to rule out was the possibility that the garment was counterfeit. Counterfeiting a garment occurs when a manufacturer sews into the article of clothing a label that fraudulently indicates that the garment meets a required standard, such as flammability or ANSI. An examination of the clothing worn by the worker found no evidence of counterfeiting. The coat contained no label that indicated that it complied with ANSI standards and the label in the insulated coveralls was found to be accurate in classifying the garment as ANSI Class 1. The long sleeve fluorescent yellow Tee-shirt was also found to be accurately labeled as ANSI Class 2.

- Rule Out #2

The investigators attempted to determine if the outer coat, worn by the deceased worker and not in compliance with the railroad safety regulations, could have been acquired by accident, mistake or unknowingly by the worker, in a belief that the garment met the required safety standards. The style of coat is a patented design that is manufactured by the company "Safety Shirtz," and sold under their SS360 clothing line, "American Grit". On their website, the manufacturer clearly marks all garments that are ANSI certified. An examination of the ANSI

[2] See Survival Factors Attachment- Norfolk Southern PPE Policy

certified garments found that the only version of this coat available for purchase and meeting the required ANSI standard is offered in fluorescent yellow or orange and is clearly marked as ANSI compliant. The "gray/black" version of the coat, which was worn by the worker, is sold as a customized "Enhanced Visibility American Grit Stealth Zip-Up Safety Hoodie." This version of the coat is not ANSI certified nor is it identified as such in the product description (specifications) listed for the garment.

The insulated coveralls, manufactured by Viking Wear, was advertised as ANSI Class 1 compliant on the company's website and was found to be appropriately labeled in the garment.

- Rule Out #3

The worker was found to be wearing a long sleeve fluorescent yellow Tee-shirt which conformed to ANSI Class 2 standards. Under NS Safety Rules, which were adopted by National Salvage for their employees contracted by the railroad, the required Class 2 PPE garment must be worn as the outer or top layer of clothing. Interviews conducted with the coroner's office personnel, the Pennsylvania State Patrol and the first arriving EMT proved that the ANSI certified shirt was being worn under the coat and in violation of the safety rules. The EMT noted that only a small segment of the shirt was visible since the coat was being worn unzipped.

- Rule Out #4

Though National Salvage representatives advised that the hard hat worn by the worker at the time of the accident was not the one provided to him by the company; no safety issues were found regarding the hard hat. The hard hat provided the appropriate amount of head protection and was equipped with a safety light, which was recovered on the scene and found to be still operational. In addition, eye and ear protection was found and appeared to have been worn by the worker at the time of the accident.

4 Work Environment

4.1 Walking Conditions

An inspection of the track environment found that on the east of the track and in the 'six-foot,' space that separated the accident track from the siding, revealed debris piles containing used spikes, anchors and other track material. The presence of these material created a potential slip, trip or fall hazard; however, it was not believed to be causal in this accident. To the west of the main track, the terrain falls away from the track and the ballast also presents a slip, trip or fall hazard to workers. **Figure 7** is a photograph taken during the on-scene investigation showing the

track environment to include the proximity of debris piles and the grade of the terrain adjacent to the track.

Figure 7 Photograph, looking north, of the track environment to include debris piles (circled in red) lying on the east side of the track and the sloping descent of the terrain on the west side of the track. (Source: NTSB)

National Salvage conducts random onsite inspections of its employees and the job site. The organization uses an inspection checklist, which under the caption "Job Specific" includes the item "Work and Walking Conditions." The inspecting representative has the option of checking either positive or negative in relation to the work environment undergoing the inspection. Neither of the two recent onsite inspections with the deceased worker occurred at the accident location.

The NTSB continues to investigate worker fatalities and the effects of the work environment, to include walking conditions, as a potential contributing factor for the accidents. The Federal Railroad Administration (FRA) does not regulate safe walking conditions. FRA regulation 49 Code of Federal Regulation (CFR) Part 213.37 which pertains to walking conditions has been interpreted by the agency to involve the track and the requirement to control the vegetation on the railroad property or adjacent to the roadbed so that it does not interfere with the railroad employees performing normal trackside duties. The Office of Occupational Safety and Health Administration (OSHA) protects workers by ensuring the safe and healthful working environment by setting standards, providing training, and enforcing regulations regarding walking conditions covering most private and public sector employees. However, OSHA delegates its authority to the FRA as it relates to railroad workers and their working environment.

4.2 Norfolk Southern Injuries with On-track Equipment (September 2011 to Present)

The Federal Railroad Administration collects and stores data related to worker injuries for all railroads. The database maintained by the FRA includes information on worker injuries caused by on-track equipment. A review of the current data for Norfolk Southern Railways revaled that in the past 8 years, the railroad has recorded 23 incidents of workers struck by on-track equipment. The data includes 8 incidents involving the sudden and unexpected movement of equipment and one incident involving a worker caught between the equipment.

5 Emergency Response

5.1 Geographical Overview

Dauphin County, Pennsylvania is in the center of the state and has an approximate population of 286, 401. According to the U.S. Census Bureau, the county is 588 square miles of which 525 square miles is land and 33 square miles is water. The Dauphin County Department of Public Safety is the county's primary Public Safety Answering Point (PSAP) for 911 and non-emergency phone calls. The PSAP answers over 1,250 emergency and non-emergency calls per day and dispatches municipal police, fire, and emergency medicals services (EMS) for the county. The closest fire/EMS company was the Halifax Volunteer Fire Department located about three miles to the north of the scene.

5.2 Halifax Fire Department (HFD)

In the state of Pennsylvania, there are 2,448 fire companies/departments according to the Office of the State Fire Commissioner. This includes 2,354 all-volunteer companies, 22 career departments and 72 combination paid and volunteer companies. The Halifax Fire Department (HFD) is an all-volunteer department that provides the primary fire protection for the area and is located three miles north of the accident scene.

5.3 Halifax Area Ambulance and Rescue Station 13

The Halifax Area Ambulance and Rescue Station provides the primary emergency medical and emergency, non-emergency patient transportation services in the Halifax area. The station is located approximately five miles north of the accident location.

5.4 Pennsylvania State Police

The Pennsylvania State Police is the state police agency responsible for statewide law enforcement. The agency is tasked with handling both traffic and criminal investigations. The agency employs approximately 7,000 personnel, both sworn and civilian, and is divided into sixteen geographically located troops with 90 stations across the state. Troop H encompasses the Harrisburg area and operates two barracks within Dauphin County. The barracks are in Harrisburg

and Lykens, PA. Each state police barrack operates its own communications center. The state police Criminal Investigation Division (CID) stationed in Lykens was notified of the incident and sent troopers to the scene to conduct the non-traffic related death investigation.

5.5 Event Timeline

Table 1 is an excerpt from the Dauphin County ECC CAD, and Event reporting which provides a timeline of the accident events.[3]

Table 1

Time	Event	Remarks
11:20:38	**First 911 call**	**Caller identified as member of the work gang. Individual provided incorrect location**
11:23:08	**Second 911 caller**	**Provided identifiable location to generate CAD event**
11:24:21	ECC CAD generated call event	Additional calls clarified location and permitted system dispatch
11:25:24	Call first dispatched	Fire- Station 29, EMS- Station 13
11:30:04	Medevac helicopter on standby	Helicopter placed back in service at 11:49:43
11:35:28	First arriving emergency responder on scene	Fire chief 29 sets up Incident Command Post
11:35:43	First ambulance arrives on scene	Ambulance 24-2 Williamstown in the area and responds to incident
11:36:07	Update provided to ECC	I.C. reports that worker was being extricated from underneath vehicle
11:38:32	ECC notified PSP-Lykens	
11:49 a.m.	ECC notifies Dauphin County Coroner's Office	Worker pronounced by EMS supervisor on scene

5.6 Emergency Access and Survivability

An individual's ability to survive an accident can depend on several factors. One of these factors is the ability for emergency responders to gain rapid access to the victim. This includes the ability to pinpoint the victim's location, gain access to the victim on the scene and provide immediate medical intervention. In this accident, both the ability to locate the scene and the ability

[3] See Survival Factors Attachment- CAD Incident Reporting

of the responders to access the scene were hampered. The first railroad worker to call 911 was unable to provide an accurate location which delayed the ability of the County 911 CAD system to generate an event for dispatch. The first arriving ambulance found that traversing the access road alongside the track was difficult for the top heavy, low-clearance emergency vehicle which resulted in the driver having to slow down to make it to the scene. Upon arrival, the incident commander recognized the lack of accessibility via the access road and requested assistance to shut down the highway.

5.6.1 Geographical Location

The Dauphin County Emergency Communications Center uses the Computer Aided Dispatch (CAD) system. CAD enables dispatchers at 911 call centers to pinpoint an incident location and correctly dispatch the closest and the most appropriate resources to that incident scene. The CAD system's database determines the location using street addresses, highway names and milepost markers, recognized public venue, such as the White House, and street intersections. The CAD system database does not pinpoint locations based on railroad property identifiers such as main line tracks, sidings, or switches. Before every job, rail workers are provided with a job safety briefing that frequently includes references to their location based on railroad timetables, milepost markers, etc. These locations are not recognized by the system and cannot be used to request assistance in an emergency.

The first 911 call was made by a NS worker on the scene immediately following the accident. The worker provided what he believed was the incident location to the 911 call taker. However, the Dauphin County CAD could not match the address with a known location from its database and the call taker was unable to generate a dispatch event.

5.6.2 Accessibility

Upon arrival, emergency responders were met by a railroad worker that immediately directed the responding units into the site via the railroad right-of-way, access road that ran alongside the tracks. The road was comprised of uneven dirt terrain with ballast laid on top to provide traction and stability for traversing vehicles. On the scene, investigators found that the loose ballast and the sloping terrain presented problem for vehicles that did not possess a high enough ground clearance. The vehicles experienced severe impacts to the undercarriage and problems with traction on the loose ballast. During the interviews with the emergency responders, investigators found that the first arriving ambulance crew encountered difficulties in traversing the access road due to the unit's low-clearance and the lack of traction afforded by the ballast which slowed their progress to the scene and the location of the patient. The crew complained that it was slow going over the "large rocks" and at one point, the driver placed the ambulance into four-wheel drive to assist with traversing the ½ mile distance from the hard top road surface to the patient's location. The crew estimated that it took over 5 minutes to traverse that distance and arrive on the scene.

Upon arrival, the incident commander found that the worker was not accessible to emergency responders because he remained pinned underneath the spiker machine.

6 Interviews

6.1 Fire/EMS Emergency Responders

6.1.1 Fire Chief- Incident Commander, The Halifax Fire Department

The fire chief of the Halifax Fire Department was interviewed by NTSB investigator on Monday, December 13, 2021, at the fire station to discuss the response to the accident.

- The chief was at the fire station when the call was received and jumped into a utility truck to drive the three miles south to the scene. Upon arrival, the chief advised that he was met by a railroad employee who directed him into the scene.

- Upon arrival, the chief observed that the worker was still underneath the railroad equipment, but a crane had been moved into position to lift the machine off the victim. The chief advised that he conducted an overall assessment of the area, known as a scene size-up and took one photograph of the scene. The chief advised that he approached the scene from the south and stopped directly in front of the machine. He stooped down and, while looking underneath the machine, observed the worker lying face down, curled up into a ball. The worker's head was tucked under and downward and lying to the north. From his position, the chief advised that he was looking at the worker's back. The worker's legs were not visible to him where he was positioned.

- The chief watched as the crane lifted the front end of the machine up into the air approximately 2-3 feet and the worker dragged from underneath the equipment, southward, approximately ten feet. At that time, the worker was turned over onto his back and CPR was started. The chief advised that it was apparent that the worker sustained significant injury to his head and lower extremity.

- The chief advised that additional units arrived on the scene including the Paramedic in Charge (PMIC) of the Life Team unit who pronounced the worker on the scene and notification was made to the Dauphin County Coroner's Office.

- Emergency calls dispatched by the Dauphin County Emergency Communications Center are received by members of the department by radio and by pager. The initial call for service was reported as a traumatic injury. Later, the nature of the call was updated to include that the victim was trapped underneath a piece of equipment. A heavy-duty rescue truck from the Susquehanna Fire Department was then dispatched to assist. An ambulance, normally quartered several townships away, was returning to the station and passing the scene. The ambulance crew responded to assist and arrived

at the same time as the fire chief. Additional units responded to the scene from the Halifax Fire Department to include EMS units and fire equipment. In addition, the fire chief requested assistance from fire-police officers, special trained, to assist with traffic control. In total fire/EMS response to the incident included two chief officers, 1 rescue engine, and 1 utility vehicle and 13 firefighters from the Halifax Volunteer Fire Department. One heavy-duty rescue truck from Susquehanna Township, 1 ambulance from Williamstown EMS, Company 24, 1 ambulance and 1 ambulance chief from Halifax Area Ambulance and Rescue, Company 13, 1 medic unit and 1 paramedic chief from Life Team, Company 6 based in Elizabethville. The chief also confirmed that the Pennsylvania State Police also responded to the scene.

- The chief advised that several members of his fire company had received some training related to rail emergencies. He also received training several years ago. A representative from the railroad came to the fire station and provided the training to the emergency responders. Normally, the county coordinates training for emergency responders and had coordinated the previous training received by the firefighters.[4]

6.1.2 Emergency Medical Technician (EMT) in Charge, Williamston EMS

The EMT was interviewed on December 23, 2021, by telephone regarding the emergency response to the accident scene.

- The EMT advised that his unit was responding from the hospital back to quarters when the call for service was dispatched. The Williamston EMS unit was closer to the scene than the dispatched unit, so the crew answered the call. The EMT advised that his unit arrived on the scene approximately one minute after the fire chief, incident commander arrival.

- Upon arrival, they were met by a railroad employee that directed the crew into the scene via an access roadway adjacent to the railroad tracks. The roadway was constructed of rocks and the ambulance had difficulty traversing the terrain. The ambulance, being a low clearance vehicle, scrapped along the jagged rocks and the wheel had difficulty achieving tractions on the loose rocks. At one point, the driver was forced to stop and placed the ambulance in four-wheel drive, to obtain better traction to traverse the terrain. The ambulance eventually arrived on the scene, but the EMT estimated that it took them approximately five minutes to drive the approximate half mile into the scene.

- The EMT advised that upon arrival on the scene, the equipment had been lifted and the worker removed from underneath the machine. The EMT advised that the worker had

[4] See Survival Factors Attachment- Incident Command Report

sustained extensive injuries and CPR was initiated. Approximately 10-15 minutes later, the worker was pronounced by the EMS chief on the scene.

- The EMT advised that the worker was wearing some type of green or yellow garment. He was wearing an outer coat and long bulky pants. He remembered that the coat was unzipped, and the shirt underneath was visible but barely. The EMT advised that he believed that the yellow shirt was underneath the coat.

6.2 Law Enforcement

The NTSB investigator spoke to the Pennsylvania State Police, lead investigator by telephone regarding their investigation into the worker's death.

- Troopers from Troop H out of Lykens responded to the accident scene and conducted the non-traffic death investigation. Upon arrival, the worker had already been pronounced dead and was lying supine on the track.

- The state police documented the scene and the injury sustained by the worker through scene photographs and measurements. During the documentation of the victim injury, the troopers noted that the worker's fluorescent yellow shirt was worn underneath a black outer coat.

- The troopers conducted on-scene interviews with the various members of the work crew.

6.3 Dauphin County Coroner

The NTSB investigator responded to the Dauphin County Coroner's Office and met with medical personnel to discuss their investigation on the scene and the autopsy conducted on the worker.

- The investigator was provided with a detailed list of injuries sustained by the worker. In addition, the investigator was shown various pattern injuries found on the worker's body that the investigator was later able to match to parts underneath the spike machine.

6.4 Director of Emergency Communications Center, Dauphin County PSAP

On Monday, December 13, 2021, at approximately 10:00 a.m., the director of the Dauphin County ECC was interviewed by the NTSB investigator.

- Mr. Enders advised that the first call was "picked up" by the ECC call taker at 11:20:38. Due to issues with identifying the exact location of the accident scene, the call event was not generated for dispatch until about 11:24 a.m.

- An additional call was received providing more information on the location and the nature of the incident and the condition of the victim. The added information included that the victim was unresponsive and still trapped. The updated information was provided to emergency responders.[5]

6.5 Norfolk Southern Supervisors

On Wednesday, February 2, 2022, a follow up interview was conducted with the Norfolk Southern supervisors in charge of the work crew on the accident scene. The focus of these interviews was on two safety issues. The issues involved the required use of PPE and the ability of the crew to request emergency assistance at their location.

6.5.1 Gang Supervisor

- The gang supervisor has been in his current job for 2 ½ years working for the railroad.

- The supervisor advised that on the day of the accident, he provided the required job safety briefing to the work crew. The deceased worker was a part of that briefing and though the supervisor could not recall what he was wearing, he took no exception to it. The supervisor confirmed that he was aware of the railroad safety rules regarding PPE conformity but could not tell investigators what constituted ANSI Class 2 or 3. He advised that he believed that it had to do with reflective but was unsure.

- The supervisor advised that PPE is provided by the railroad to its employees only. The contractor is required to provide the appropriate PPE to its employees. The supervisor advised that he performs a visual inspection of all workers on the job site. If a worker is not in compliance, PPE will be provided to the worker. If the appropriate PPE cannot be provided, the worker would be removed from duty.

- Disciplinary action following a failure to comply with the PPE standards can vary from a verbal warning to a written letter of discipline to removal from service. The supervisor advised that this policy applies to both Norfolk Southern personnel and to National Salvage personnel. Though he acknowledged that regarding National Salvage personnel, he would consult with their supervisor first before taking any punitive action. Norfolk Southern maintain records on employee disciplinary actions which include failure to comply with the company safety rules.

- The supervisor advised that job safety briefings are conducted to address the job task, expected hazards, and address any safety concerns. Contractors are encouraged to take part in these briefings.

[5] See Survival Factors Attachment- Emergency Response Interviews

- The supervisor was not one of the individuals on the scene that called 911. When asked to provide the location of the accident site, the supervisor could only advise that it was north of Harrisburg. The supervisor advised that providing crews with their geographical location was not typically information given during the job safety. The crew depends on the Roadworker in Charge (RWIC) who is local to the site to provide that information.

6.5.2 Gang Foreman

- The gang foreman advised that he has been in his current position for approximately 6 years working for Norfolk Southern.

- The gang foreman advised that he and the gang supervisor provided a job safety briefing to the work crew. The foreman advised that he observed the worker at the briefing dressed in his "normal get up." He described the worker's clothing as a black jacket, hard hat with reflective tape. He advised that the PPE equipment was not provided by the railroad. The foreman advised that he was familiar with the railroad safety rules, to include required PPE and was able to accurately name the class of safety clothing required but admitted that he did not know the difference between ANSI Class 2 and Class 3. When asked to describe what constitutes ANSI Class 2, the foreman advised he thought it had something to do with reflective tape.

- The foreman was asked about any personal items worn by the worker that may have obscured the reflective material on the back of the coat, such as the black backpack found at the scene and removed by the crew. The foreman confirmed that the worker was wearing the black backpack but stated that it was small and only covered the top of the coat.

- The gang foreman advised that if a worker was found to be not in compliance with the PPE requirements, the gang foreman advised that he would talk to the worker and provide the appropriate PPE if the worker did not possess it. The foreman advised that he did not find exception to the PPE clothing being worn by the worker.

- The foreman advised that he was aware of one incident involving non-compliance with NS PPE policy. The worker was a regular NS employee and not a contractor. He advised that he never had an issue with a contractor and if he observed a violation

involving a contractor he would consult with his supervisor, the gang supervisor, to determine what to do. Violations are documented but not by the foreman.

- The foreman advised that he did not call 911. He advised that work crews are not typically provided information, such as their geographical location. The foreman advised that he knew that they were near Harrisburg and relied on the RWIC, who is familiar with the area, to provide the necessary location information.

- The foreman advised that he was not near the railroad worker, who was first 911 caller.

6.6 National Salvage Employees

On Friday, February 4, 2022, follow up interviews were conducted with employees of National Salvage. The interviews were conducted with the Boom truck operator on the scene of the accident and the organization's safety manager.

6.6.1 Boom Truck Operator

- The operator stated that he had been employed with National Salvage for approximately 4 years. He began working with the deceased worker in July of 2021.

- A job safety briefing was held prior to the accident and was presided over by the gang supervisor. The briefing included the day's plan and any hazards that were expected to be encountered. The worker was at the briefing, though the operator was not sure if he was dressed in his equipment at that time. Later, he advised that he observed the worker wearing a black hoodie[6] and black shirt with reflective strips. He was also wearing a hard hat and safety glasses.

- The truck operator advised that he was wearing a high visibility (Hi-Viz) sweater, yellow in color that was not issued by the company. He purchased the garment online at Amazon. It believed that the garment met the ANSI Class 2 or 3 standard, could not remember which, but noted that he was looking for a garment that was compliant with the safety regulations and checked to ensure that the garment met the standard to keep out of trouble with the company.

- The truck operator advised that he had seen the worker wearing the coat a few times prior to the accident. He was unaware of anyone having exception to it.

[6] Hoodie- a euphemism for a coat or jacket with a hood sewed into the garment to provide head protection from the elements.

- The operator advised that in addition to annual inspection of equipment, such as his vehicle, the company, National Salvage has an inspection program as well. He advised that he normally performs the inspection himself and ensures that he is following FRA regulations. The worker advised that he has never had an on-site inspection of his PPE. When asked by the National Salvage Safety Manager, the truck operator advised that the safety manager had come out to the job site several times and performed an inspection of the work area. (The safety manager interjected that the inspection would have been documented and the form would have been signed by both he and the worker.) The worker advised that he has never had an on-track inspection by the FRA.

- In response to questioning, the worker advised that they could purchase anything and do not have to run the purchases by national Salvage management for permission if it met FRA standards. The worker advised that he always checked the label to ensure that it met the proper certification.

- The truck operator advised that he did not call 911. He was not told in the safety briefing of the crew's location other than the "rail milepost marker." The worker did not know where he was other than the location he was provided.

6.6.2 National Salvage Safety Manager

- The Safety Manager advised that it was his job to ensure that equipment undergoes inspection and employee training. This includes new employees who are provided with training regarding safety rules.

- The safety manger advised that as part of his job, he visits individual workers in the field to conduct random in the field inspections. The safety manager advised that either he or the project manager would conduct the inspection which were documented. He estimates that there are approximately sixty-five employees, working in various teams, that he inspects. A copy of the inspection is kept in the employee's file with a copy given to the employee after the front office has received a copy of the inspection.

- Depending upon the severity of the violation, a disciplinary letter can be given and placed in the employee's file. The safety manager believes (not quite sure) that the letter would remain in the employees file as long as the worker was employed by the organization.

- The deceased worker was last inspected by the safety manager on February 23, 2021, in Columbus, Ohio. During that inspection, the worker was found to be following the company's PPE policy. The safety manger advised that he never saw the black garment the worker was wearing prior to the accident. The manager advised that had he observed the worker wearing the garment, he would have taken exception to it.

- The safety manager advised that National Salvage provides employees with the appropriate PPE based on the policy of the railroad they will be working with. Additional PPE is sent out annually and replacements can be requested in case of damage. Employees are also provided with a company credit cards to purchase additional PPE such as gloves, eye, and ear protection, etc. Each National Salvage employee, working for NS, was provided with a Norfolk Southern notebook which outline the railroad's PPE requirements.

- The safety manager denied that he had ever spoken to the deceased worker regarding Hi-Viz apparel. He had counseled the worker back in January regarding his lack of hearing protection use even when working alone and his constant removal of his safety glasses.

- In response to a question regarding National Salvage tracking the credit card use of its employees, especially regarding the purchase of PPE, the safety manager advised that he did not know if the garment worn by the worker at the time of the accident was purchased using the company credit card. He was unfamiliar with how the company checks what employees purchase using the company credit card.[7]

7 Post-accident Activities

7.1 Norfolk Southern Railway Company

As a result of the investigation into the contract worker fatality in Reed, PA; Norfolk Southern Railways implemented changes to address the related safety issues. The railroad's post-accident actions related to their safety program are discussed below.

7.1.1 Program Maintenance Supervision Training

NS has issued additional training to all Program Maintenance Supervision on NS Safety Rule 1044 to address the requirements of the railroad and outline ANSI Class 2 and Class 3 standards. The training not only addresses the required level of PPE, but it also addresses the appropriate method of wear and the need for supervision to include contractors to ensure compliance with the regulation. The training is being provided to all Program Maintenance employees and will also address training of contractors in the need to train and supervise their employees on the PPE policy.

[7] See Survival Factors Attachment- Norfolk Southern and National Salvage Safety Policy Interviews

7.1.2 Enhanced Job Safety Briefings- Emergency Response

NS has issued instructions to all their Program Maintenance Supervisors and employees that from this point forward, the job safety briefing given to employees on the scene will include providing those individuals with their geographical location in the event of an emergency. NS Safety department is considering applying this to all future job briefings for all NS employees.[8]

7.2 National Salvage

As a result of the investigation, National Salvage agreed to implement the following changes to ensure employee compliance with PPE standards. The following changes will be incorporated into the company's safety policies and oversight procedures.

7.2.1 Standardized Checklists

National Salvage will provide a standardized checklist to each of its Rail Division employees that will inform them of the ANSI standards for PPE and the required compliance with railroad regulations.

7.2.2 Internal Audits and Inspections

National Salvage will conduct two internal audits and inspections that will include an audit of credit card purchases made by employees regarding safety equipment. In addition, National Salvage project managers and the safety director will continue to review PPE regulation compliance during on-site job inspections to ensure compliance with ANSI standards and railroad regulations.[9]

[8] See Survival Factors Attachment- NS Response to Safety Issues
[9] See Survival Factors Attachment- National Salvage Response to Safety Issues