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Federal Railroad Administration, Office of Railroad Safety

Accident Investigation Summary Report CFE-2021-22

Norfolk Southern Railway Corporation – Contractor Fatality
Reed, Pennsylvania
December 8, 2021

1. EXECUTIVE SUMMARY

On December 8, 2021, a fatal accident occurred involving an employee of the National Salvage and Service Corporation (NSSC), referred to as the decedent. The decedent, employed as a laborer since August 5, 2019, was responsible for grading, marking, cutting, and assisting with the stockpiling of rail. The incident took place on the Norfolk Southern (NS) Buffalo Line in Reed Township, Pennsylvania.

The decedent was based at NSSC's Bloomington, Indiana, headquarters but frequently traveled with railroad gangs for operational tasks. The NS R12 curve patch gang (R12 gang), which included 2 NSSC contractors, was engaged in replacing 1,342 feet of continuous welded rail (CWR) between Milepost (MP) BR 295.00 and MP BR 295.25. The decedent's role involved marking the rail for removal and grading.

At approximately 11:20 a.m., EST, the decedent was performing his duties near MP BR 295.11 on the main track. The accident occurred when spiker No. 2, a machine used by the R12 gang, struck the decedent.

The accident was caused when spiker No. 2 inadvertently struck the decedent as he was positioned in the gage of the track. Despite immediate emergency actions by NS employees, the decedent did not survive.

2. ACCIDENT SEQUENCE OF EVENTS

On December 8, 2021, an accident involving an NS contractor, employed by NSSC, occurred on the NS Buffalo Line in Reed Township, Pennsylvania. The decedent, who began employment with NSSC as a laborer on August 5, 2019, was involved in grading, marking, cutting, and stockpiling rail for removal.

The decedent was based out of NSSC's headquarters in Bloomington, Indiana, and frequently traveled with railroad gangs. On the day of the accident, the decedent began his workday at 5:30

a.m., EST, at the Quality Inn in Selinsgrove, Pennsylvania, and subsequently traveled to meet the R12 gang at MP BR 297.0.

The Buffalo Line, which spans from Driftwood, Pennsylvania, (MP BR 134.0) to Harrisburg, Pennsylvania, (MP BR 306.2), is configured in a north-south direction. The line comprises 172 miles of single main track and 15 passing siding tracks, with maximum authorized speeds ranging from 10 to 50 mph. The accident occurred on the mainline at MP BR 295.11, approximately 617.6 feet south of Control Point (CP) North Ferry. The adjacent siding track is 13'8" east of the mainline track.

The R12 gang, composed of approximately 25 workers, including two NSSC contractors, performs "curve patch work" involving the removal and installation of CWR on the high side of curves. The R12 gang utilizes about 15 roadway maintenance machines, including a grapple truck. They employ three spiking machines: spiker No. 1 (gage spikes), spiker No. 2 (spikes on consecutive ties), and spiker No. 3 (spikes in the outside holes of tie plates).

On the day of the accident, the R12 gang was assigned to remove and install 1,342 feet of CWR between MP BR 295.00 and MP BR 295.25. After the morning safety briefings at approximately 7:00 a.m., EST, at MP BR 297.0, the decedent traveled to MP BR 295.1 to prepare for work. He began grading and marking the rail once on-track protection was established.

At approximately 9:42 a.m., EST, the Roadway Worker in Charge (RWIC) temporarily lifted on-track protection to allow a freight train to pass, re-establishing protection at 10:12 a.m., EST. The decedent reported over the radio that his task was taking longer than usual due to the rail's condition, which included different manufacturers, joint bar holes, and welds. He requested to work between the Cribber/Adzer and Badger Crane to avoid delays.

Around 11:20 a.m., EST, while in the gage of the main track, the decedent was struck by spiker No. 2, which was backing up to assist spiker No. 3. The operator of spiker No. 2 initially felt as though he had run over a weld but later realized that the decedent was under the machine. Immediate emergency procedures were initiated.

The accident was reported over the radio, and all work was halted. The supervisor instructed the foreman and RWIC to call 911 and directed the mechanical supervisor to clear the right-of-way for emergency responders. Attempts to lift the spiking machine using a turntable were unsuccessful due to the curve's elevation. Subsequently, a Badger crane was used to lift the machine off of the decedent upon the EMT's arrival at the scene.

EMTs arrived at 11:24 a.m., EST, and were able to remove the decedent from beneath spiker No. 2. Despite efforts to provide CPR, the decedent was pronounced dead at 12:45 p.m., EST, by the coroner.

3. INVESTIGATION AND ANALYSIS

The FRA investigation, initiated on December 8, 2021, found no deficiencies or irregularities in employee qualifications. FRA post-accident toxicological testing was conducted for the decedent

and the operator of spiker No. 2, with negative results for both drugs and alcohol.

Employee Fatigue

FRA analyzes work schedules using the FAID Quantum (Fatigue Assessment Tool by InterDynamics, which incorporates two biomathematical models (BMMs) of fatigue. The first BMM, known as Fatigue Audit InterDyne (FAID) Standard BMM, predicts the effect of different work schedules on fatigue and provides a representative FAID score of the fatigue exposure of a worker. That FAID score indicates the likely sleep opportunity that a work pattern allows. As the relative sleep opportunity associated with a work pattern decreases, the FAID score increases. The second biomathematical model, known as FAID Quantum BMM, predicts the likely timing of sleep and fatigue exposure of a worker and is expressed as a Karolinska Sleepiness Scale (KSS) score based on the work schedule.

FRA uses a FAID score of greater than or equal to 63 as the threshold for analysis. A FAID score of greater than or equal to 63 is the level at which the risk of a human factors related accident exceeds pure chance. As the FAID score continues to increase above 63, the greater the likelihood that fatigue exposure was contributory to an accident.

For the operator of Spiker 2, at the time of the incident and for the entirety of the shift in which the accident occurred, the FAID score did not exceed 63 and the KSS score did not exceed 7 (“Sleepy, but no difficulty remaining awake”), indicating no evidence of fatigue risk unless exceptional circumstances had diminished normal sleep in the preceding 48 hours.

While the scores of the decedent indicate higher levels of fatigue impairment, FRA determined that his actions had no impact on the sequence of events to conclude that fatigue was a contributing factor to the overall outcome. Therefore, FRA concluded that that fatigue was not a likely contributor to the cause or severity of this accident.

NS Operating Rule Violations

The investigation revealed that the operator of spiker No. 2 did not adhere to NS operating rules for the safe operation of roadway maintenance machines while reversing direction. Specifically:

- The operator failed to comply with NS Operating Rule 814(a), which requires a warning signal and confirmation that the way is clear before reversing direction. Instead, the operator looked only in the sideview mirror and proceeded to back up.
- Based on a sight test distance performed by NS, NSCC, FRA, and the National Transportation Safety Board (NTSB), it was determined that from the operator’s seat, visibility to detect someone standing in the middle of the track 39 feet behind the machine was extremely limited. Effectively determining that the way was clear would have necessitated the operator standing or exiting the machine, which the operator did not do, as required by the railroad operating rules.

FRA’s investigation also determined that the decedent was within 25 feet of spiker No. 2 at one point. This violated NS Operating Rule 818(d), which requires a safety briefing and clear

understanding of movements between the machine operator and employees who are within 25 feet of the machine. No such briefing occurred.

These failures to comply with NS operating rules also violated 49 CFR § 214.313(a), which provides that each roadway worker is responsible for following the on-track safety rules of the railroad upon which the roadway worker is located.

FRA's investigation concluded the failure of the spiker No. 2 operator to adhere to NS Operating Rule and 814(a), was the probable cause of the accident. Additionally, the lack of a job briefing pursuant to NS Operating Rule 818(d) contributed to the accident's cause and severity.

Equipment Involved

Spiker No. 2 (GS 15022) was inspected by FRA following the accident, in which the following deficiencies were identified:

- The change-of-direction alarm was not functioning as required by 49 CFR § 214.511(b), which required spiker No. 2 to have an automatic change-of-direction alarm that provides an audible signal that is at least three seconds long and is distinguishable from the surrounding noise. Tests revealed that the alarm did not provide a consistent, audible signal, and the rear-facing speaker was found unplugged, affecting the alarm's decibel level and audibility.
- The horn on spiker No. 2, which consists of four trumpets, had only one trumpet producing sound at a decibel level much lower than that of an identical machine with a fully functional horn. The horn on spiker No. 2 was therefore not in compliance with 49 CFR § 214.511(a), which requires the spiker to have a horn or other audible warning device that produces a sound loud enough to be heard by roadway workers and other machine operators within the immediate work area.
- The intermittent warning light was obstructed by a roof-mounted air conditioning unit, violating 49 CFR § 214.509(c), which requires an unobstructed 360-degree warning light.
- The machine lacked an operator's manual, as required by 49 CFR § 214.341(b).
- The operator failed to conduct a thorough equipment inspection pursuant to 49 CFR § 214.527(a), which requires an operator of an on-track roadway maintenance machine to check all machine components for compliance with 49 CFR Part 214, Subpart D—On-Track Roadway Maintenance Machines and Hi-Rail Vehicles (Subpart D), prior to using the machine at the start of the operator's work shift. (Subpart D encompasses 49 CFR §§ 214.501 through 214.533). As a result, the operator failed to identify the Subpart D defects discussed above.

The FRA investigation concluded the failure to conduct an adequate equipment inspection and identify defects, including those related to the change-of-direction alarm, horn, and warning light, in addition to the missing operator's manual, were significant contributing factors to the accident's cause and severity.

Personal Protective Equipment

The decedent was wearing a black jacket with reflective stripes and overalls, which did not meet the required visibility standards. Specifically, the garments did not comply with NS's Safety and General Conduct Rule 1044(b), which mandates ANSI Class II or III standards for visibility if not wearing an NS-issued high visibility safety vest. The decedent's jacket, which was black, did not meet the required fluorescent yellow-green color and was only compliant with ANSI Class I Level 2 standards.

The FRA investigation concluded the decedent's failure to adhere to NS's personal protective equipment requirements contributed to the accident's cause and severity.

4. CONCLUSION

The FRA investigation determined that the probable cause of the accident was:

- **Operator Error:** The operator of spiker No. 2 did not comply with the requirement to operate the machine prepared to stop within half the range of vision and failed to provide a warning signal and ensure the way was clear before reversing direction, as mandated by NS operating rules. The operator was responsible for complying with the operating rules with pursuant to § 214.313(a).

FRA also determined that the following factors contributed to the cause and severity of the accident:

- **Equipment Inspection Failures:** The operator did not conduct an adequate equipment inspection pursuant to § 214.527(a), thereby failing to identify that spiker No. 2 had defects that were not in compliance with § 214.511(a) and (b) and § 214.509(c).
- **Lack of Job Briefing:** There was no job briefing between the decedent and the spiker No. 2 operator, violating NS Operating Rule 818(d), which requires a briefing when an employee is within 25 feet of equipment. The operator and decedent were responsible for complying with this rule pursuant to § 214.313(a).
- **Inadequate Personal Protective Equipment:** The decedent did not adhere to NS rules regarding personal protective equipment, impacting visibility and safety. The decedent was responsible for complying with these operating rules pursuant to § 214.313(a).