Stein, LLC

Before the National Transportation Safety Board

Office of Railroad, Pipeline and Hazardous Materials Investigations

NTSB Accident Number – RRD23LR007

Accident Date – March 7, 2023

Stein, LLC's Submission of

Proposed Findings, Probable Cause, and Safety Recommendations in connection with the collision of a Norfolk Southern Railway train and a Stein truck on the grounds of Cleveland Cliffs - Cleveland Works in Cleveland, Ohio

FINAL SUBMISSION

Rocky Agozzino – Vice President of Operations at Stein, LLC

Stein, LLC, is a party in the above-referenced National Transportation Safety Board ("NTSB") investigation of a collision between a Norfolk Southern Railway train (the "NS train") and a Stein dump truck (the "Stein dump truck"). The collision took place on the property of Cleveland Cliffs – Cleveland Works ("CC-CW") in Cleveland, Ohio. Stein is submitting these proposed findings, probable cause, and safety recommendations for the NTSB's consideration.

PROPOSED FINDINGS

I. Summary of Collision

On March 7, 2023, at 1:08 am (EST), a NS train collided with a Stein dump truck. The collision occurred at a private highway-railroad grade crossing on the grounds of CC-CW. A NS employee died as a result of this collision. Two pieces of evidence provide essential details about the nature and circumstances of the collision: (1) a time-stamped surveillance video that was provided by CC-CW; and (2) a time-stamped event recorder that was on the NS train. The surveillance video shows the Stein dump truck approach a stop sign, come to a full stop, wait for five seconds, and then proceed slowly in the direction of the train track. As the Stein dump truck nears the track, it is struck by the oncoming NS train. The event recorder on the NS train documented the train's speed and the distance it traveled in one-second intervals. The event recorder also documented when the brakes were applied.

After reviewing the surveillance video and event recorder together, two key facts emerged: (1) the NS train was traveling at the maximum permissible speed on CC-CW property, and it struck the Stein dump truck *before* the NS engineer applied the train's brakes; and (2) the Stein truck driver could not see the NS train from the stop sign because the NS train was *outside* his field of vision. The speed of the NS train, the angle of the road approaching the train tracks,

and a photo taken from the driver's seat of the Stein dump truck prove the NS train was at least five feet outside the driver's field of vision. These findings, and many others, are detailed below.

II. The NS Train

The NS train was operated by two NS employees. The locomotive was driven by a NS engineer. That locomotive was pushing 12 train cars along the track. This pushing is referred to as a "shoving movement," which means the locomotive shoved the train cars forward along the track. The decision of the NS engineer to use a "shoving movement" meant the locomotive was at the rear-end of the moving train. And, as such, the locomotive's headlights did not illuminate the front-end of the moving train.

The 12 train cars consisted of: (a) eight covered hopper cars; and (b) four tank cars. The front-end of the moving train was a tank car (the "lead tank car"). The lead tank car measured 42 feet in length, 14 feet and 4 inches in height, and was painted black. There were no head lights, no side lights, and no reflective markings on the lead tank car.

The lead tank car carried an NS conductor. That conductor was in possession of a small lantern and a hand-held radio. The small lantern was the only source of light on the lead tank car. The NS conductor's role was to act as the "eyes and ears" of the train, meaning that he was responsible for making sure the track was clear of any obstacles and communicating that information to the NS engineer via a hand-held radio. The decision to proceed with a "shoving movement" meant the NS engineer, who controlled the speed of the train and its braking system, was at the mercy of the NS conductor's timely observations and communications via the handheld radio.

The lead tank car had a running board, which measured 10 feet in length, 10 inches in width, and was approximately four feet above the ground. A running board may assist a

conductor in a "shoving movement" by giving that conductor a place to stand, look forward, and warn the engineer of any upcoming hazards.

III. The Stein Dump Truck

The Stein dump truck was operated by a Stein employee. The truck is known as a "Euc," which is drawn from the name of the original manufacturer, Euclid. The Stein dump truck weighs approximately 35 tons and stands 12 feet, 2 inches high. At the time of the collision, the bed of the truck was partially filled with limestone that was being transported within the CC-CW steel mill.

The dump truck's driver was seated in a self-contained compartment at the front of the truck. There were no obstructions to his view out the driver's side and front windows. However, there was a partial obstruction to the driver's view out the passenger side window. This partial obstruction was due to an exhaust pipe and fire extinguisher that were mounted on the truck by the original manufacturer. As such, when the driver looked to his immediate right, he could see out the front 2/3^{rds} of the passenger window, but he could not see out the back 1/3rd of the passenger window. This is noteworthy because the NS train approached from the passenger side of the Stein dump truck.

IV. The Train Track

The train track is located on the grounds of CC-CW. In brief summary, CC-CW operates a steel mill in Cleveland, Ohio, that covers 100s of acres and is open 24 hours a day, 365 days a year. The steel mill is private property that is owned by CC-CW. The public cannot enter the steel mill unless they pass through a guard station at the front entrance that is protected by a crossing gate that blocks vehicular traffic.

There are a number of different train tracks on the grounds of CC-CW. NS uses some of the tracks to transport raw materials into the steel mill via trains so that employees of CC-CW can use those raw materials to make steel. Further, NS transports the finished goods from the steel mill via trains to reach their final destination(s). The track where the accident took place is a track that NS was using for these purposes.

Stein has a contract with CC-CW and is permitted to work on the grounds of CC-CW. In particular, Stein provides slag processing and steel mill services. In various shifts throughout the day, Stein employees enter the grounds of CC-CW and perform these services. Stein does not own any land on the CC-CW site and, as a result, Stein has no ability to change the conditions of the train tracks or the areas surrounding the train tracks. This includes the track where the accident took place.

There are multiple sections on the grounds of CC-CW where train tracks intersect with roads that are used by cars and trucks. In the location of the accident, there is an intersecting road where vehicles were forced to approach and cross the train track at an angle. Exhibit 1 depicts the track and angle of crossing:

The train track is straight for over 100 yards as it approaches this intersecting road. If a person is traveling down that track on a train, there are no obstructions to viewing vehicles approaching and crossing the intersection. Exhibit 2 depicts a view looking down the train track:

In the location of the accident, the lighting is inadequate. There was one utility pole with four lamp heads that partially illuminated the area; however, on March 7th only two of those four lamps were working. The malfunctioning lamps made the lighting problem even worse.

There was a small stop sign in the direction the Stein dump truck driver was traveling on March 7th. However, there were no flashing lights, no protective gates, and no bells to signal when a NS train approached this intersection. The protective equipment at this intersection was woefully inadequate.

The train track in the location of the accident is owned by NS. That does not mean NS owns the property surrounding the track. Although Stein has not reviewed the contract(s) defining who owns property on the grounds of CC-CW, Stein believes CC-CW is the lawful owner of the land surrounding the track. When the NTSB asked who owned that land, CC-CW

stated that “Cliffs still has not been able to determine the question of ownership of the crossing.” NS gave a more useful answer to the same question, stating “[t]he subject crossing is a private grade crossing on the property owned by Cleveland-Cliffs.”

V. The NS Engineer

The NS engineer was hired in 1999 and has decades of experience operating trains. The event recorder revealed the NS train was traveling 10 mph before colliding with the Stein dump truck. That is the maximum speed for a train operating within CC-CW.

The engineer was as at the back end of the train, and on the opposite side of where the Stein dump truck approached. As such, the engineer could not see the Stein dump truck or the collision. At the time of the accident, the NS engineer had been on duty for 6 hours, 38 minutes. Fatigue and inattention by the NS engineer do not appear to be factors in this crash.

The NS engineer was interviewed shortly after the accident. He noted that he did not think the truck driver saw the approaching train. His comment underscores how poor the lighting conditions were in that area, and perhaps inadvertently, how deficient the lights were on the lead tank car. In that same interview, the NS engineer also provided important details about the NS conductor’s clothing. He explained the NS conductor was wearing a personal rain jacket that was tied tightly around his head and ears to protect from weather as it was sleeting outside. Any person wearing such clothing would have limited peripheral vision, meaning their line of sight would be narrowed. Further, the NS conductor’s ears were covered by his hood. This limited his ability to hear the engine of the Stein dump truck as the NS train approached the intersecting road.

VI. The NS Conductor

The NS conductor was hired in 2004 and therefore had substantial work experience. His job performance in recent years was alarming. The NTSB found evidence of "multiple incidents" from 2019 - 2023 that involved the NS conductor and "were noted as serious." The NTSB has not identified what those incidents involved, nor how many incidents there were. Even so, in light of that work history, as well as the facts and circumstances of this accident, it is fair to question whether the NS conductor was acting in a safe and professional manner on March 7th.

Notably, despite video evidence and witness statements, no one knows the NS conductor's exact position on the lead tank car before the collision. This is a critical fact. The video depicts a small lantern on the front of the lead tank car, but the video does not show the NS conductor holding that lantern.

The NS conductor was wearing a reflective vest at the time of accident. The Cuyahoga County Medical Examiner's Office, which examined the NS's conductor's remains, documented and photographed his "Level 2 high-visibility vest." If the NS conductor was standing on the running board while holding a small lantern, then the video should show the lantern's light reflecting off his reflective vest. Thers is no reflection seen on the video. These facts create an inference that the NS conductor was not standing on the front of the lead tank car, where the lantern is seen in the video.

In addition, although the Stein dump truck was damaged when it was hit by the NS train, the damage was relatively mild. Exhibit 3 depicts the damage to the truck:

The lack of damage to the front right passenger side of the Stein dump truck indicates the truck was close to, but not on, the track when it was struck. Stated differently, if the front passenger side of the Stein dump truck extended onto the track, the damage to the truck would have been far more extensive.

The lack of damage to the Stein dump truck is noteworthy here because the NS conductor was pinned between the NS train and the truck. If the NS conductor had been standing in the middle of the running board on the front end of the lead tank car, he would not have been pinned in that position. The dump truck never extended that far onto the track. The physical evidence suggests the NS conductor was positioned on the far corner of, or perhaps on the side of, the lead tank car. Under Norfolk Southern Rule 217(a), the NS conductor "must be stationed at, on or ahead of the leading end of movement to . . . observe conditions ahead . . . [and maintain] radio communication . . . to the Engineer[.]"

The weather conditions also need to be considered here. The NS Conductor had been on his shift for 6 hours and 38 minutes. At 1:08 am, he was working outside in brutal conditions. The NTSB consulted local weather reports, which indicated the temperature was 37 degrees at

the time of the accident with overcast skies and intermittent flurries and sleet. Visibility in these conditions is challenging. Staying warm in these conditions is impossible, especially when factoring in wind chill as the NS train was moving 10 MPH. There was no heat source to keep the NS conductor warm beyond the clothes on his body. Given these circumstances, it would make sense for the NS conductor to balance between acting as the "eyes and ears" of the NS train and keeping himself warm by moving back-and-forth along the 10-foot train platform.

The NS train was traveling along a straight portion of the train track. If the NS conductor looked straight ahead, there were no obstructions to his line of sight. The surveillance video shows the Stein dump truck stopped at the stop sign for 5 seconds, with its headlights and side warning strobes on. The headlights and strobes illuminated the area in front of, and to side of, the truck. The video also shows the Stein dump truck moving forward for 3 seconds before it is struck by the NS train. The event recorder documents the fact the NS engineer had not applied the brakes when the NS train struck the Stein dump truck. The NS engineer said he immediately applied the brakes when the NS conductor warned him. Given these facts, it follows that the NS conductor did not see the Stein dump truck for the vast majority of those 8 seconds (i.e., the 5 seconds the truck was stopped, and the 3 seconds the truck was moving). The Stein dump truck *should* have been seen by the NS conductor; indeed, it was in a fixed position and had two working head lights and side warning strobes. The NS conductor's failure to see the dump truck and alert the NS engineer until it was too late is a mistake that must be attributed to the NS conductor.

VII. <u>The Stein Truck Driver</u>

The Stein truck driver was hired on January 10, 2022. He had extensive experience working at CC-CW. Stein produced records documenting the fact he crossed this section of the

train track hundreds of times prior to March 7, 2023, and multiple times on the night of the accident. The Stein truck driver was therefore very familiar with the road conditions, lighting conditions, and dangers inherent in this section.

The NTSB interviewed the Stein truck driver after the accident. He explained "[t]he way you pull up to the tracks is at an angle." Given that angle, a driver cannot cross perpendicular to the track. Further, given that angle, a driver must look to their right side and behind them to see far down the track. The obstructions on the passenger side of the Stein dump truck made that view impossible. The angle of approach therefore created a serious risk for the Stein truck driver.

The Stein truck driver worked night shifts. After his previous workday, he went home and had a full night of sleep. He woke up at 4 pm on March 6, 2023. He left for work at 8:30 pm, arrived at 9:00 pm and began his shift at 10:00 pm. He was working for 3 hours and 8 minutes at time of accident. Toxicology results showed no drugs or alcohol in his system. There is no evidence he was on the phone or distracted at the time he was driving. After the accident, he described himself as feeling "fine" when he started his shift. His supervisor confirmed that everything was "normal" when the driver started his shift.

There were no headlights on the lead train car. It would have been far easier for the Stein truck driver to see the train if the locomotive was leading, as the locomotive is equipped with headlights. The Stein truck driver reported he never heard a horn prior to the accident. The event recorder on the NS train notes the horn was turned "off." The NS engineer's decision to use a "shoving movement" and to turn off the horn deprived the Stein truck driver of visual and audio warnings that could have prevented this accident.

In his interview with the NTSB, the Stein truck driver said he believes there should be warning lights and gates to protect the drivers and trains at the intersection. His supervisor

echoed those comments. The supervisor identified two areas within CC-CW that presented serious crossing issues. The accident location was one of those. The supervisor explained that Stein personnel raised these safety concerns with CC-CW approximately six months before the accident. CC-CW made no changes, despite that warning.

VIII. The Surveillance Video & Event Recorder

An integrated review of the surveillance video and event recorder establishes the fact that NS train struck the Stein dump truck before the brakes had been applied.

Time	Event
1:08:27	Stein Truck Stops at the Stop Sign, Remains There For 5 Seconds
1:08:27 – 1:08:32	NS Train Travels Forward at 10 MPH
1:08:32	Stein Truck Begins to Move Forward from Stop Sign
1:08:32 – 1:08:36	NS Train Continues to Travel Forward at 10 MPH
1:08:35	NS Train Strikes Stein Truck
1:08:37	NS Train Engineer Applies Brakes
1:08:43	NS Train Comes to a Complete Stop

The video shows the Stein dump truck approach on the southeast side of the tracks and stop at a small stop sign. The Stein truck driver explained his actions by noting "I stopped, I looked, I did not see a train." The video evidence fully supports his account.

At 1:08:27, the event recorder verified the NS train was moving 10 MPH. Some basic math is useful to put that speed into a proper context. There are 5,280 feet in a mile. A train traveling at 10 MPH is therefore covering 52,800 feet in an hour. In the course of one minute (i.e., $1/60^{th}$ of an hour), a train traveling at 10 MPH is therefore covering 880 feet. That means the train is moving 14.6 feet per second as it travels at 10 MPH. That specific number (14.6 feet per second) needs to be considered in assessing the Stein driver's field of vision.

In its post-accident analysis, the NTSB investigators pulled the Stein dump truck slightly past the stop sign, to the location that appears in the video. Exhibit 4 depicts what a driver can see from this location during the day:

Critically, the NTSB "investigative group determined . . . this field of view best approximated that of the truck driver on night of the accident." In this position, the NTSB found a driver can see approximately 38 feet to their right. Since the NS train was traveling 14.6 feet per second, it follows the NS train was **not** within the Stein driver's field of vision when he stopped and looked to his right. This fact is proven by the 3 seconds the Stein dump truck moved forward before it was struck by the NS train. During those 3 seconds, the NS train was traveling at 10 MPH and covering 14.6 feet per second. That means the NS train traveled 43.8 feet during those 3 seconds. Because the Stein truck driver could only see 38 feet to his right when stopped at the sign, the NS train was **never** within the Stein truck driver's view because the NS train was at least 43.8 feet to the right.

The video evidence and witness interviews establish that the Stein truck driver stopped, looked, listened, and saw nothing approaching on the train tracks. It defies logic to conclude that

he could, or should, have done anything more before he began to move the Stein dump truck towards the train tracks. He explained his actions "I did not see a train, so I let off the brake, I proceeded and then, when I saw the train, I hit the brake again, but it didn't do anything. Not that the brake didn't do anything, I just - - I was too far forward."

IX. The NS Conductor Does Not See the Dump Truck

The NS engineer explained the time before the collision by stating "we come up [to] the first crossing, he always says crossing protected, no traffic. I repeat it to him. Keep shoving back. Then the next crossing he says 20, clear 20 and crossing protected, no traffic and then it wasn't much longer after that, that he just yelled stop[.]"

The recorded radio communications between the NS engineer and the NS conductor are clear on one point: the NS conductor never used the word "stop." NTSB investigators reported it was possible the NS conductor used the words "that will do" to tell the NS engineer to stop. A possibility is far from a proven fact. And, if NTSB investigators do not know what the NS conductor said after listening to the recording multiple times in an office environment, it strains reason to conclude the NS engineer heard exactly what was said. What is clear is that the NS conductor said something, the NS engineer heard it and concluded he needed to stop the train. Although the NS engineer immediately tried to do that, the brakes had not been applied when the NS train struck the Stein dump truck. This indicates the NS conductor said something only a second or two before the collision.

The NS engineer explained his actions by stating "I just put full service and the independent on and we stopped pretty quickly." The phrase "pretty quickly" demands further analysis here. It took 6 seconds from the time the brakes were applied on the train (1:08:37) until the train came to a complete stop (1:08:43). The forces stopping the NS train include the brakes,

but also, the impact of colliding with and pushing the dump truck. The event recorder notes the NS train moved 62 feet from the time the brakes were applied until it came to a complete stop (3,386 feet to 3,448 feet). It is clear that a train of this size and weight, moving at 10 MPH, and traveling on tracks that would have been slick with the sleet that was falling, did not stop "pretty quickly" from a time perspective or a distance perspective. Accordingly, the speed of the NS train in these weather conditions is another factor in this accident.

X. The Coroner

A toxicological examination at the Cuyahoga County Medical Examiner's Office found the NS conductor had no drugs or alcohol in his body at the time of the accident. An autopsy determined the cause of death was exsanguination (i.e., the severe loss of blood) due to a blunt impact injury. The manner of death was accident. The coroner explained that absent an individual on scene with advanced medical knowledge (e.g., a surgeon) who had the ability to clamp off the femoral artery of the NS conductor immediately after the accident, the deceased could not survive this injury. Further, the coroner believed the NS conductor died of his injures before emergency responders arrived.

Stein credits these medical facts and opinions. Thus, it will not analyze the times that emergency responders were notified and reported to the scene. There was nothing the emergency responders could have done to change the outcome of this accident.

XI. The NS Engineer and Conductor Violated Company Policy

The NS engineer and NS conductor violated Norfolk Southern policy by using a "shoving movement" without a spotter. Norfolk Southern Operating Rule 120[1] controls the passage of a train through this kind of intersection. The violation is clear from a review of the rule. The engineer was not at the head of the train (i.e., the front), he was at the rear of the train pushing the cars forward. There was no NS crew member on the ground directing the NS train. And, none of the exceptions in sections (b)(1) – (b)(4) apply.

[1] Operating Rule 120 - Cars Not Headed By An Occupied Engine over a Highway-Rail Grade Crossing

(a) When cars not headed by an occupied engineer are moved over a:

- public crossing
- private crossing located outside the physical confines of a rail yard
- pedestrian crossing located outside the physical confines of a rail yard
- yard access crossing

A member of the crew must be on the ground at the crossing to warn traffic until the leading end has passed over the crossing. Rail movements over the crossing will be made only on proper signal from an employee.

(b) These actions are not required if the crossing is clear; and

1. The crossing gates are in the fully lowered position, and are not known to be malfunctioning; or
2. The crossing is equipped with flashing lights, crossbucks, or stop signs and is clearly seen that no traffic is approaching or stopped at the crossing, and the leading end of the movement over the crossing does not exceed 15 MPH; or
3. A qualified employee, other than the crew member, with the ability to communicate with trains is stationed at the crossing to warn traffic; or
4. The crossing has been rendered inaccessible to highway motor vehicles.

PROBABLE CAUSE

Stein concludes there are eight (8) significant factors that are the probable cause of the March 7, 2023, collision of the NS train and Stein dump truck. The factors are as follows:

- The absence of protective gates, flashing lights, and bells created an unsafe intersection of the train track and road.
- The lighting was inadequate at night and created an unsafe intersection of the train track and road.
- The angle the Stein dump truck was forced to take to approach the train track created an unsafe condition. The Stein driver was forced to look to his right side and back to see down the train track, and his field of vision was severely limited by this angle.
- The NS conductor was not focused on the conditions in front of him. The NS conductor had an unobstructed view of the Stein dump truck for at least 8 seconds, and he did not promptly warn the NS engineer of the presence of the truck.
- The NS engineer's decision to use a "shoving movement" at night created an unsafe condition because the headlights of the locomotive were at the back of the NS train and pointing in the opposite direction of travel. The lead train car had no headlights, no side lights, and no reflective markings to visually alert others that it was approaching.
- The NS engineer's decision to use a "shoving movement" at night created an unsafe condition because the NS engineer relied upon the NS conductor to be his "eyes and ears." This delayed the prompt use of the braking system on the train. Further, because the train was traveling at 10 MPH, which is the maximum permissible speed, and moving on a track that was moist from falling sleet, the NS train could not stop quickly once the brakes were applied.

- The NS engineer and NS conductor violated Norfolk Southern Operating Rule 120 by failing to use a spotter on the ground to facilitate the safe passage of the train through an intersection.
- The NS engineer's decision to turn off the train's horn deprived the Stein truck driver of an auditory warning that would have told him the NS train was approaching.

SAFETY RECOMMENDATIONS

Stein recommends the following safety measures:

(1) Install protective gates, flashing lights, and bells at the intersection of this train track and road.

(2) Install additional lights at the intersection of this train track and road to better illuminate the area.

(3) Change the angle that trucks and cars approach, and then cross, the intersection of this train track and road. The angle has changed since March 7th, and the change improved safety at the intersection. However, further improvement is possible.

(4) Require additional lighting on the lead tank car of any train that is engaging in a "shoving movement" at night.

(5) Require use of a horn on the lead tank car of any train that is engaging in a "shoving movement" at night.

(6) Reduce the maximum speed of any train that is engaging in a "shoving movement" at night. A maximum speed of 5 MPH will reduce the time it takes for a train to stop once the brakes are applied.

(7) Require compliance with Norfolk Southern Operating Rule 120.

CERTIFICATE OF SERVICE

I certify that on October 30, 2023, I have electronically served upon Mr. Gregory Scott (gregory.scott@ntsb.gov), Investigator in Charge, National Transportation Safety Board, a complete and accurate copy of these proposed findings, regarding the collision of a NS train and a Stein dump truck, occurring on March 7, 2023 in Cleveland, Ohio (NTSB No. RRD23LR007). An electronic copy of the same was also forwarded to the individuals listed below in this certificate of service, as required by 49 CFR §831.14(a) (Proposed Findings).

David Gooden,
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Respectfully submitted,

[redacted]

Rocky Agozzino
Vice President of Operations, Stein, LLC
[redacted]**(Cell)**
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