

**NATIONAL TRANSPORTATION SAFETY BOARD**

**Office of Railroad, Pipeline and Hazardous Materials Investigations  
Washington, DC**

**FACTUAL REPORT**

**A. ACCIDENT**

NTSB Accident Number:	RRD19FR002
Date of Accident:	November 30, 2018
Time of Accident:	10:20 am (EST)
Railroad Owner and Operator:	CSX Transportation
Maintenance of Way Crew:	CSX, Welding Team
Train Number:	F-794-30
Fatalities:	1
Injuries:	0
Location of Accident:	Estill, SC

**B. PARTY MEMBERS**

Tomas Torres  
Investigator-in-Charge  
National Transportation Safety Board

Joe Gordon  
Track and Engineering Group Chairman  
National Transportation Safety Board

Michael Hoepf  
System Safety Investigator  
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Nathan Wolfe  
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Steve Ammons  
Director of Train Handling Rules- Party Spokesperson  
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Roy Morrison  
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Brotherhood of Maintenance of Way Employees

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International Association of Sheet Metal, Air, Rail and Transportation Workers

### **C. ACCIDENT SUMMARY**

On November 30, 2018, at 10:20 a.m. eastern standard time, CSX Transportation (CSX) northbound freight train F-794-30, traveling about 50 mph, struck and killed a CSX track welder. The accident occurred at the North End Estill Siding switch, MP S-449.7, on the CSX Columbia subdivision in Estill, South Carolina. The welder was occupying the track as the train approached; an additional roadway worker was at the work location and had been assigned to watch for approaching trains and provide a warning to the welder. The crew members of train F-794-30 told investigators that they did not realize that a person was on the track until moments before impact. The crew of train F-794-30 sounded the train horn and bell; however, there was no response from the roadway work group. At the time of the accident, the sky was clear; the wind was from the southeast about 4 mph, and the reported temperature was 60°F.

## D. ACCIDENT DETAILS

### Interviewees

Investigators from the NTSB and other parties interviewed the following CSX employees:<sup>1</sup>

- Locomotive Engineer (Train F-794-30)
- Conductor (Train F-794-30)
- Watchman/Lookout
- Roadmaster (Engineering Supervisor)
- Assistant Welder

### The Accident

The following description of the incident is based on the interviews:

The roadway work group consisted of a track welder and one additional roadway worker who was assigned as a watchman/lookout (watchman).<sup>1</sup> The welder had been tasked to repair the surface of a track frog in the switch at the North End Estill Siding switch.<sup>2</sup> (See figure 1.) During interviews, the watchman stated that prior to the accident the welder had told him that the work was complete. The welder and the watchman were both headquartered in Yemassee, South Carolina. The welder had about 10 years of railroad service, and the watchman had about 4 years of railroad service.

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<sup>1</sup> Transcripts of these interviews are available in the public docket.



Figure 1. Photo of track frog at the accident location.

**[508 text:** The photo shows track components in the frog section of a railroad switch. In the foreground is the running rail and guard rail of the main track. Near the middle of the photo is the frog; the running rail and guard rail in the siding are located above the frog. Under the track components are crossties and subgrade material standard to railroad infrastructure.]

The CSX Columbia subdivision consists of 137.5 miles of single main track between milepost S-359.7 and milepost S-497.2. According to CSX documentation, on average there are 22 trains that operate daily over the CSX Columbia subdivision. Train movements on the main tracks in this area are controlled by centralized traffic control and governed by operating rules, general orders, timetable instructions, and the signal indications of an absolute block system.

On the day of the accident, a job briefing was held at 7:00 am in Yemassee, SC. During the job briefing, the Roadmaster changed the regular assignment of the trackman from working with the section to working with the welder to provide train approach warning (TAW); the employee's normal assignment was as a trackman with the section. The section is a local track maintenance work group and a trackman is a laborer position. During the interviews, investigators were told that this change of job assignment was made because the second welder, who is assigned to the welding team, had taken the day off from work. The trackman told investigators that the welder was the roadway worker in charge (RWIC) and that the welder had informed him that they would be using TAW as their method of on-track safety when welding the frog at the North End Estill Siding switch. The CSX Roadmaster told investigators that he gives his employees their work assignments and tells them what type of protection to use. During his interview, he confirmed that he told the welder to utilize TAW when welding the frog at the North End Estill Siding switch.

The trackman told investigators that he and the welder arrived at the North End Estill Siding switch at about 8:00 am. Shortly after they arrived, the welder instructed him that "they was going to use watchman/lookout" and they decided that the trackman would perform the duties of the watchman/lookout.<sup>2</sup> The form of protection designated in the CSX operating rules and Federal Railroad Administration (FRA) Railroad Workplace Safety regulation is Train Approach Warning. Train Approach Warning is provided by a watchman/lookout. Railroad employees commonly refer to Train Approach Warning on-track safety protection as watchman/lookout.

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<sup>2</sup> From this point forward in the report, watchman will be used to characterize the trackman that was assigned to provide Train Approach Warning.

After discussing the on-track safety, the welder started to perform grinding on the frog of the switch. The watchman recalled that prior to the accident, one southbound train had traversed the track through the work location. The watchman said “I seen it coming. I went up; I said, John, you got a train coming. And he got out the track, put the grinder down, and then stepped over the track to the other side, and we split the train as it was coming through. Investigators asked for clarification regarding “splitting the train”, the watchman described that he and the welder went to opposite sides of the track in order to visually inspect the passing train. After the southbound train passed, the welder stepped back in the track and continued to work on the frog.

Investigators asked about the clothing and safety equipment that the two employees were wearing, specifically to assess if high-visibility vests, shirts, or jackets were worn. The watchman told investigators the following “I had on a full shirt that was yellow with reflective. While he was welding, he had on a yellow jacket, welding jacket. But he removed his jacket once he was done welding and he just had on a black T-shirt”. An exemplar high-visibility, florescent safety vest was in the interview room. Investigators pointed out the vest and the witness confirmed it to be the same color as the vest he was wearing the day of the incident. Further, the watchman said that neither employee was wearing hearing protection, but the welder had at least one ear bud in his ear.

Investigators asked the watchman to describe what was happening at the work location at the time that the accident train arrived; “So when the second train arrived, explain to us where you were at and what were you doing” The watchman replied “He had told me that we were done, to roll up the welding leads, and I turned around and was facing the truck rolling up the leads on the

side of the truck, and that's where I was standing. And I -- something caught the side of my eye, and when I turned around, he was still in the track". The watchman said that he did not hear any warning from the approaching train; including the train's bell or horn. Investigators asked "Now you said that the welder said that he was done, and he told you to start rolling up the leads. So, in your – you know, in your mind at that time were you still providing train approach warning or had your duties changed when he made that statement?". The watchman replied "I mean, he was still in the track. I just turned and done what I was told to do."

### **Train F-794-30**

On November 30, 2018, the engineer and conductor went on duty at 7:00 am in Savannah, GA. The crew was called to operate freight train No. F-794-30. After a job safety briefing with the train's Conductor, the engineer prepared the locomotives for the trip. The train consisted of 74 cars, 6,583 trailing tons and was about 4,804 feet long. The authorized train speed was limited to 50 mph because of train make up. Maximum authorized speed for this track was 79 for passenger and 60 mph for freight trains.

After preparing the locomotives, the crew waited on another train to clear tracks, then they completed the building of the train and departed the yard. They departed the yard traveling northbound and meet one train at Garnett siding.

The engineer recalled that there were about 8-9 highway-rail grade crossings just prior to the accident location. By FRA regulation and CSX operating rule the Engineer is required to sound the locomotive's horn as it approaches and traverses highway-rail grade crossings.<sup>3</sup> The engineer

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<sup>3</sup> CSX Operating Rule 203.2- Approaching public highway grade crossings. Sound the horn for at least 15



said that he was operating the train at speeds between 45 and 48 mph, and the train's last signal indication was a clear signal. The engineer stated "Once we got to the Estill signal, there are multiple crossings once you pass the south-end signal, there are multiple crossings, so we continued to blow. Once we got to the, I think by the second, maybe the third crossing, we were blowing, and we can tell there was some kind of debris on the north-end of the Estill signal. It looked like debris. Something was in the track. Maybe looked like, maybe a trash bag or something like that got hung up on the frog, or the track, or what have you, and the siding. So, we really couldn't make heads or tails of it, so we continue and as we got closer, I say about that, I know there's a Jenks store right on the -- there's a store, you know, on the road right next to the track, and somewhere in there we noticed a truck".

The engineer said that as he got closer, he recognized the truck as a CSX truck, "As we get closer, we noticed a CSX truck, and we noticed there a high visible vest, that somebody was outside the truck. Their back was to us and they were, I guess, he was looking in the truck or towards the truck, but his back was toward us. And as got closer, we just laying on the -- I'm blowing and blowing, and I would say I can't give you a range of how close we were before we noticed that that was an employee that was in the track, but by the time we noticed it, it wasn't long before we -- I'm laying on the horn and I just -- from what I could see was like in a split second, it was like, oh, that's, you know. And so, immediately, I hit the brakes. Did what I can do to stop".

The train came to a stop about 5340 feet after applying the brakes. The engineer stated that he had

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seconds, but no more than 20 seconds, before the lead locomotive enters the crossing. Trains or locomotives traveling at speeds greater than 45 MPH shall begin sounding the horn at or about, but not more than, one-quarter mile in advance of the nearest public crossing, even if the advance warning provided by the horn will be less than 15 seconds in duration. This signal is to be prolonged or repeated until the train or locomotive occupies the crossing or, where multiple crossings are involved, until the last crossing is occupied.

no prior notice or warning of the welding team working in the area.

The conductor gave the following account of the accident:

“We were approaching line speed, 60-mile an hour. We had a 50-mile an hour train, running at approximately 45-miles an hour. We knocked down the south end signal, blowing the horn, first crossing. Got to the second crossing. Know that something was in the track. Didn't know what it was at that time. And then once we crossed by the next crossing, which is across the street from Jenks Motor Sport, there's a tree on the east side of the rail that hangs over, a little bit close to the rail, blocking the view. Once we cleared that tree, we could see there was a CSX truck parked on the right-hand side, on the east side of the rail. And once we saw the look, lookout, that's when we realized it, more than likely, was a person in the middle of the track. And as we got closer, he was wearing dark clothing, black shirt, blue jeans, bent over. He was, it looked like, to me, he was on his knees facing, he was facing the same direction as travel, facing north. And he was just crouched down so low, I honestly didn't know it was a person until we saw that CSX truck. And after that, it was too late to, I mean, it was just confusion. Both locked up. And that's when we struck him”.

### **CSX Roadway Worker and On-Track Safety Operating Rules**

CSX engineering department employees are governed by the CSX Roadway Worker and On-Track Safety Rules found in Chapter 7 of the CSX Employee Operating Manual. The introduction to this section states the following: This section defines procedures to prevent cars, locomotives, on-track equipment or other equipment from striking roadway workers (including contractors) performing their duties. The rules in this section comply with relevant regulations

contained in the Code of Federal Regulations (CFR) Title 49, Part 214.

The following methods of on-track safety are available to roadway workers:

- EC-1/EC-1e Line 1 Authority
- Individual Train Detection, Train Approach Warning, and Train Coordination
- Working Limits on Non-Controlled Tracks
- Working Limits on Controlled Tracks (Conditional Stop)
- Removing Controlled Track from Service

The subject roadway work group, working on controlled tracks inside the interlocking, utilized Train Approach Warning as their method of on-track safety.

Train Approach Warning-Rule 705.3

Use of Train Approach Warning for on-track safety only if:

1. At least two qualified roadway workers are working together and one the employees is designated as the watchman,
2. All employees can reach an established place of safety at least 15 seconds before a train or on-track equipment reaches the location,
3. A method of communicating the approach or a train is established,
4. Employees hold a job briefing and all confirm their understanding and responsibilities,
5. Employees are performing routine maintenance or minor repairs that will not affect the safe passage of trains or on-track equipment,
6. Watchman/lookout knows and maintains required sight distance,
7. Watchman/lookout has unrestricted ability to see and hear approaching trains or on-track equipment, and
8. Watchman/lookout has access to a working radio.

## **FRA Railroad Workplace Safety Regulation**

### Train Approach Warning

#### 49 CFR 214.7- Definitions

Watchman/lookout means an employee who has been annually trained and qualified to provide warning to roadway workers of approaching trains or on-track equipment. Watchmen/lookouts shall be properly equipped to provide visual and auditory warning such as whistle, air horn, white disk, red flag, lantern, fusee. A watchman/lookout's sole duty is to look out for approaching trains/on-track equipment and provide at least fifteen seconds advanced warning to employees before arrival of trains/on-track equipment.

49CFR 214.329-Train approach warning provided by watchmen/lookouts. Amendment and published on June 10, 2016.

Roadway workers in a roadway work group who foul any track outside of working limits shall be given warning of approaching trains by one or more watchmen/lookouts in accordance with the following provisions:

(a) Train approach warning shall be given in sufficient time to enable each roadway worker to move to and occupy a previously arranged place of safety not less than 15 seconds before a train moving at the maximum authorized speed on that track can pass the location of the roadway worker. The place of safety to be occupied upon the approach of a train may not be on a track, unless working limits are established on that track.

(b) Watchmen/lookouts assigned to provide train approach warning shall devote full attention to detecting the approach of trains and communicating a warning thereof, and shall not be assigned any other duties while functioning as watchmen/lookouts.

(c) The means used by a watchman/lookout to communicate a train approach warning shall be distinctive and shall clearly signify to all recipients of the warning that a train or other on-track equipment is approaching.

(d) Every roadway worker who depends upon train approach warning for on-track safety shall maintain a position that will enable him or her to receive a train approach warning communicated by a watchman/lookout at any time while on-track safety is provided by train approach warning.

(e) Watchmen/lookouts shall communicate train approach warnings by a means that does not require a warned employee to be looking in any particular direction at the time of the warning, and that can be detected by the warned employee regardless of noise or distraction of work.

(f) Every roadway worker who is assigned the duties of a watchman/lookout shall first be trained, qualified and designated in writing by the employer to do so in accordance with the provisions of §214.349.

(g) Every watchman/lookout shall be provided by the employer with the equipment necessary for compliance with the on-track safety duties which the watchman/lookout will perform.

### **Selection of Train Approach Warning**

Investigators spoke with the CSX roadmaster who chose train approach warning as the protection for the work being performed on the day of the accident. He said that methods of track protection that provided workers with exclusive track occupancy were safer than train approach warning, and “it's not a common practice for me to do watchman/lookout.” However, he said that the work that was being performed on the day of the accident was “not going to be that long of a task.” When asked if welding for several hours equates to a short amount of time, he replied:<sup>4</sup> “Well, like I say, there's nothing in the rule book that states that.” When asked if it is sometimes a challenge to obtain exclusive track occupancy, he replied “It varies.”

### **On-Track Safety Job Briefing**

The FRA publishes a compliance document, *Track and Rail and Infrastructure Integrity Compliance Manual Volume III Railroad Workplace Safety*, Chapter 3 Roadway Worker Protection (January 2014). The document is based on five fundamental safety principles:

1. A person who is not fouling a track will not be struck by a train.
2. A person who is fouling a track upon which a train will not move will not be struck by a train.

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<sup>4</sup> See CSX roadmaster interview transcript page 26.

3. No person should foul a track unless that person knows either that
  - a. No train will arrive or
  - b. The person on the track will be able to move to a place of safety before a train arrives.
4. Each roadway worker bears the ultimate responsibility for his own on-track safety.
5. Each employer is responsible for providing the means for achieving on-track safety to each roadway worker employee.

The FRA's Roadway Worker Protection Compliance Manual provides the railroad industry with interpretations of and guidance on the railroad workplace safety regulations. The compliance manual regarding 49 *CFR* 214.315 stresses four points for roadway work group job briefings:

1. An employer shall provide a job briefing for workers fouling a track.
2. A job briefing for on-track safety shall be deemed complete only after workers have acknowledged understanding the on-track safety procedures and instructions presented.
3. Work groups that will foul a track shall have one qualified roadway worker designated to provide on-track safety for all members of the group.

4. The designated person shall inform all workers in the group of the on-track safety procedures to be followed and also shall inform them when any changes to the on-track safety procedures are made.

Based on the interview with the surviving roadway worker, and job briefing forms that were completed by the two-member welding team, Investigators determined that there was no discussion of required elements of the use of train approach warning, such as:

- The previously arranged place of safety,
- the clearing time required to reach the arranged place of safety, and
- the required sight distance to detect an approaching train

### **Sight Distance Observation**

At the accident location, the North End Estill Siding switch, MP S-449.7, the maximum authorized train speed is 79 mph for Amtrak passenger trains and 60 mph for freight trains. Based on this highest speed of 79 mph for passenger trains, the employees would have needed between 3000 feet and 5280 feet depending on the required clearing time. During the sight distance observation, the team determined that the watchman would have had about 1.6 miles of sight distance for the accident train. It was also determined that the watchman would have had about 2.7 miles of sight distance for southbound trains.





Figure 2. Photo showing sight distance standing near the accident location, facing south.

**[508 text:** The photo shows the sight distance observed in a south direction when standing near the accident location. In the photo two railroad tracks are seen. The track to the left in the photo is the main track, the track on the right-hand side is the Estill siding. In addition to the tracks, the railroad signal that controls northbound movements is seen. Included in the picture is railroad ballast, a highway parallel to the tracks on the left-hand side. Also pictured, is vegetation and structures on the left-hand side and vegetation on the right-hand side.]





Figure 3. Photo showing sight distance standing near the accident location, facing north.

**[508 text:** The photo shows the sight distance observed in a north direction when standing near the accident location. In the photo a single railroad track is seen diverging into two tracks from the North End Estill Siding switch in the foreground of the picture. In addition to the tracks, the railroad signal that controls southbound movements is seen. Included in the picture is railroad ballast, and a highway parallel to the tracks on the right-hand side. Also pictured, are members of the investigative team, vegetation, automobiles, and a small railroad structure on the right-hand side and vegetation on the left-hand side.]

### **CSX Welding Truck**

The subject work crew traveled to the North End Estill Siding switch by highway in CSX

welding truck 240150. This truck was registered for highway use, equipped with hi-rail guide wheels for traversing railroad tracks, and equipped with the tools and equipment necessary to perform welding task. The truck was also equipped with internal and external radios programmed to monitor radio channels used for CSX operations.

On December 2, 2018, investigators inspected the welding truck at the CSX engineering department office in Yemassee, SC. Investigators identified required documents that were kept in the operating cab of the truck. The investigative team requested that CSX employees start the trucks engine and the welding machine and place the throttles in the positions that they would be in when work was being performed, this was done to observe the level of ambient noise produced. During this effort, a train passed on an adjacent track and investigators noted that the train's horn could be heard over the noise produced by the welding truck in a working state.

Investigators determined that the radio located in the cab of the welding truck was functional, however, the external radio (mounted inside a cabinet on the body of the truck) was not able to be heard. The external radio was disconnected from a speaker mounted on the body of the truck, near the middle, on the passenger's side. Two other speakers were in the same cabinet as the radio, however, neither of those were properly connected to the radio.



Figure 4. Photo showing the external radio mounted inside of a cabinet on the body of CSX welding truck No. 240150.

[508 text: The photo shows a radio with microphone manufactured by Kenwood. The radio is mounted inside of a cabinet.]





Figure 5. Photo showing disconnected wire connector that was intended to connect the external mounted speaker to the external radio. The wire was disconnected from the radio and hanging inside the cabinet.

[508 text: The photo shows a disconnected, white, wire connection. An investigator is examining the components. Also pictured is a portion of cable with orange insulation.]



Figure 6. Photo showing two speakers that were located inside the truck cabinet that contained the external radio.

[508 text: The photo shows two radio speakers located inside a truck cabinet. Also shown are multiple wires, some of which are not connected. An investigator is seen examining the components.]

During the interview with the watchman/lookout, investigators asked “Did you guys have a working radio with you?” The watchman responded “I know the inside radio worked. And thinking back on it now, I don't -- I never heard the outside radio. I don't know if it worked or not.” Investigators asked, “Is that -- is there a procedure to test a radio, do a radio test prior to beginning work activity?” the watchman responded, “Yes, sir. You're supposed to make sure you got a

working radio.” Investigators: “Did you guys get a chance to do that?” the watchman responded, “No, sir”.

### **Internal Oversight- CSX Operational Testing**

Periodically, railroad employees are tested on various aspects of their job to evaluate their ability to perform their jobs correctly and their knowledge of company rules and Federal Railroad Administration (FRA) regulations. This testing not only evaluates the worker’s skills and overall ability to perform a task safely and correctly, it also reinforces compliance with rules. Investigators requested CSX’s operational testing records for two years prior to this accident. A review of the data showed that between November 30, 2016 and November 29, 2018, the Roadmaster for the CSX Columbia subdivision had conducted a total of 1,652 operational test of employees. Of those 1,652 tests, he did not conduct any test of the CSX 705 Rules. The CSX 705 Rules cover the following forms of on-track safety: individual train detection, train approach warning, and train coordination. Investigators also noted that there were no failures noted in any of the 1,652 test that were conducted.

Investigators also reviewed operational test conducted by other supervisors for the same time period for all the engineering department employees that were assigned to the CSX Columbia subdivision on the day of the accident. Investigators learned that other CSX supervisor had conducted observation of the CSX 705 Rules on twelve different occasions; no failures were noted during any of those observations. For the two years records that were reviewed the subject welder had never been tested on compliance with the 705 rules; the watchman had been tested once.

## **External Oversight- FRA Roadway Worker Protection Inspections**

The FRA's Office of Railroad Safety regulates safety throughout the Nation's railroad industry. To carry out its mission, FRA staff includes about 400 Federal safety inspectors who operate out of eight regional offices. Railroads that are part of the general system in the state of South Carolina are overseen by FRA Region 3, headquartered in Atlanta, Georgia. In addition to federal inspectors, the state of South Carolina Office of Regulatory Staff has inspectors that work in conjunction with FRA staff. Safety inspectors focus primarily on five safety disciplines when conducting inspections for compliance and enforcement; those disciplines are:

- Hazardous Materials
- Motive Power and Equipment
- Operating Practices
- Signal and Train Control
- Track

FRA Region 3 personnel are responsible for the oversight of the general railroad system operating in the following states:

- Kentucky
- Tennessee
- North Carolina
- South Carolina
- Mississippi
- Alabama



- Georgia
- Florida

Track and Railroad Workplace Safety inspections in Region 3 are primarily carried out using a staff of 21 safety inspectors: 13 FRA inspectors, and the following state inspectors from Florida (2), Alabama (2), Tennessee (1), Mississippi (1), North Carolina (1), and South Carolina (1).

A review of FRA inspection activities related to RWP regulation revealed that FRA Region 3 inspectors completed 245 RWP inspections from January 2017 through the day of the accident. These inspections resulted in the identification of 213 areas of non-compliance with FRA regulations that were reported as defects to the railroads, 16 recommendations for civil penalty to be assessed against the railroads, and 5 individual liabilities written in the form of regional warning letters to railroads employees.

### **Track Description**

The CSX-Columbia subdivision consists of 137.5 miles of single main track between milepost S-359.7 and milepost S-497.2. According to CSX documentation, the 2017 total tonnage figure for the subject track between milepost S-366.6 and milepost S-376.4 was about 4.5 million gross tons. On average there are 22 trains that operate daily over the Columbia subdivision.

CSX inspects and maintains the main track near the accident location to Federal Railroad Administration (FRA) Track Safety Standards (TSS) for Class 4 track, which allows for a maximum operating speed of 60 mph for freight trains and 79 mph for passenger trains. The accident occurred at the North End Estill Siding switch, MP S-449.7. This switch provides entry

into the Estill Siding which is inspected and maintained to FRA Class 1 standards, with a maximum authorized speed of 10 MPH for freight train and passenger trains. Amtrak operates 2 passenger rail trains (one northbound and one southbound) over this subdivision 7 days a week.

Generally, the main track leading up to the accident location was constructed with crossties that measured 9-inches by 7-inches by 8-feet 6-inch long, spaced 19.5 inches on center (nominal). On the main track, the rail sections were 132 lb. continuous welded rails were fastened to the crossties using standard double shoulder tie plates fastened with spikes on each rail. These fasteners and anchors are used to maintain gage and alinement of the track as well as restrain longitudinal movement of the continuous welded rail (CWR). The track was supported by granite rock ballast.

Traveling on main track, the northbound train traversed a descending grade ranging from .24% to .39%, beginning at milepost S-451.3 to the point of impact (POI) at milepost S-449.7. The main track curvature leading up to the POI from milepost S-451.3 was entirely tangent track.

On December 1, 2018, an FRA Track Safety Inspector conducted an inspection of the switch at the North End of Estill Siding. The inspectors noted six defective conditions; one defective crosstie condition identified required train speeds to be reduced until repairs were made by CSX personnel.

CSX track inspection records from June 2018 to the date of the accident were reviewed by an FRA track safety inspector. The inspection records were complete, and no exceptions were noted. In addition, investigators reviewed CSX track maintenance records including, track disturbance reports, track geometry testing records, and rail inspection records for the accident

location; no exceptions were noted.

## **CSX Employee Training**

CSX provided training records for the engineering department employees involved in this accident. The welder completed Roadway Worker Qualification training on January 11, 2018. The employee assigned as the watchman completed Roadway Worker Qualification training on January 10, 2018. This training covers all aspects of Roadway Worker protection including Train Approach Warning and Employee in Charge (EIC) training.<sup>5</sup>

According to CSX documentation, the welder was qualified as an EIC on the CSX Augusta, Charleston, and Columbia subdivisions. The assigned watchman was qualified as an EIC on the CSX Andrews and Charleston subdivisions.

## **Work Schedules**

The CSX Roadmaster informed investigators that he supervises ten engineering department employees that are utilized to maintain about 289 miles of track. The engineering department employees reported to the CSX Engineering Office in Yemassee, SC. Normal work hours are 7:00am – 3:30pm, Monday through Friday; Saturday and Sunday are scheduled rest days. Employees are subject to work overtime (outside of normal shifts) if required to maintain the track structure.

CSX documentation shows that the welder had worked only his assigned shift from

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<sup>5</sup> CSX defines Employee-in-Charge as a designated roadway worker qualified on Operating and On-Track Worker Rules and physical characteristics who is responsible for all movements and on-track safety for a roadway work group within working limits.

Monday, November 26, 2018 to the day of the accident. The assigned watchman worked 8 hours overtime on Monday, November 26, 2018. From November 27, 2018 leading up to that day of the accident November 30, 2018 he worked his normal shift from 7:00 a.m. to 3:30 p.m.

### **Method of Operation**

The method of train operation was by signal indication of a traffic control system (TCS). The Columbia Subdivision is a timetable north-south direction (geographic east-west direction).

The maximum authorized train speed on the Columbia Subdivision was 60 mph for freight trains with permanent speed restrictions between posted timetable mileposts.

Train movements on the Columbia Subdivision were governed by operating rules, timetable instructions, and the signal indications of the traffic control system.

### **Operation Documents**

The crews were governed by the following documents containing the operating rules and procedures:

- CSXT Employee Operating Manual, Effective April 1, 2017
- Columbia Subdivision Timetable No.2, Effective October 1, 2018

### **Locomotive Safety Devices**

The lead locomotive was equipped with a headlight, auxiliary lights, and the horn warning device required by Federal regulations. The lead locomotive was also equipped with a bell and positive train control, locomotive event recorder, and an alerter.<sup>6</sup>

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<sup>6</sup> 49 CFR Part 229 defines an *alerter* as a device or system installed in the locomotive cab to promote continuous, active locomotive engineer attentiveness by monitoring select locomotive engineer-induced control activities. If fluctuation of a monitored locomotive engineer-induced control activity is not detected within a

The Federal Railroad Administration (FRA) motive power and equipment inspector tested these devices at the accident site. The FRA inspector also tested and inspected the train brakes and found them functioning as intended. The locomotive safety devices were in full compliance with Federal requirements.

### **Train Crew 10 Day Work History**

### **Engineer 10 Day Work History**

Previous Time Off	Date/ On Duty Time	Date/ Off Duty Time	Total Time On Duty
10 hours	11/05/2018- 7:30 a.m.	11/05/2018- 5:50 p.m.	10 hours, 20 minutes
99 hours	11/13/2018- 5:30 a.m.	11/05/2018- 4:10 p.m.	10 hours, 40 minutes
38 hours, 35 minutes	11/15/2018- 8:00 a.m.	11/15/2018- 6:30 p.m.	10 hours, 30 minutes
36 hours, 30 minutes	11/17/2018- 7:00 a.m.	11/17/2018- 4:26 p.m.	9 hours, 26 minutes
13 hours, 34 minutes	11/18/2018- 6:00 a.m.	11/18/2018- 2:15 p.m.	8 hours, 15 minutes
25 hours, 15 minutes	11/19/2018- 3:30 p.m.	11/19/2018- 8:34 p.m.	5 hours, 4 minutes
13 hours, 26 minutes	11/20/2018-10:00 a.m.	11/20/2018-4:54 p.m.	6 hours, 54 minutes

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predetermined time, a sequence of audible and visual alarms is activated so as to progressively prompt a response by the locomotive engineer. Failure by the locomotive engineer to institute a change of state in a monitored control, or acknowledge the alerter alarm activity through a manual reset provision, results in a penalty brake application that brings the locomotive or train to a stop.

12 hours, 21 minutes	11/21/2018- 5:15 a.m.	11/21/2018- 4:35 p.m.	8 hours, 35 minutes
24 hours, 25 minutes	11/22/2018- 5:00 p.m.	11/22/2018-11:09 p.m.	6 hours, 9 minutes
17 hours, 21 minutes	11/23/2018- 4:30 p.m.	11/23/2018-11:43 p.m.	7 hours, 13 minutes

**Conductor 10 Day Work history**

Previous Time Off	Date/ On Duty Time	Date/ Off Duty Time	Total Time On Duty
37 hours, 45 minutes	10/30/2018-5:30 p.m.	10/31/2018-2:15 a.m.	8 hours, 45 minutes
99 hours	11/08/2018-10:30 p.m.	11/09/2018-7:41 a.m.	9 hours, 11 minutes
23 hours, 19 minutes	11/10/2018-7:00 a.m.	11/10/2018-3:14 p.m.	8 hours, 14 minutes
99 hours	11/14/2018-8:00 p.m.	11/15/2018-1:40 a.m.	5 hours, 40 minutes
16 hours, 5 minutes	11/15/2018-5:45 p.m.	11/15/2018-10:09 p.m.	4 hours, 24 minutes
99 hours	11/20/2018-7:00 a.m.	11/20/2018-3:00 p.m.	8 hours

16 hours	11/21/2018-7:00 a.m.	11/21/2018-3:01 p.m.	8 hours, 1 minute
15 hours, 29 minutes	11/22/2018-6:30 a.m.	11/22/2018-3:01 p.m.	8 hours, 31 minutes
15 hours, 59 minutes	11/23/2018-7:00 a.m.	11/23/2018-3:06 p.m.	8 hours, 6 minutes
27 hours, 39 minutes	11/24/2018-6:45 p.m.	11/25/2018-3:30 p.m.	8 hours, 45 minutes

### Engineer Certification Information

Hire Date	07/15/2003
Current Certifications Issued Date	12/31/2015
Current Certification Expiration Date	12/31/2018
Last Skills Evaluation Date	05/26//2018
Last Knowledge Exam Date	07/10/2018
Last Physical Characteristics Exam Date	07/10/2018
Last Vision Exam Date	06/10/2018
Last Hearing Exam Date	06/10/2018
Last Efficiency Test	11/23/2018

**Conductor Certification Information**

Hire Date	09/30/2013
Current Certification Date	12/31/2016
Current Certification Expiration Date	12/31/2019
Last Skills Evaluation Date	11/20/2018
Last Knowledge Exam Date	01/23/2019
Last Physical Characteristics Exam	02/02/2019
Last Vision Exam Date	01/23/2019
Last Hearing Exam Date	01/23/2019
Last Efficiency Test Date	11/20/2018

**Medical/ Toxicology**

Medical Report will be placed in the docket

**Cellular Phone**

Cell Phone report will be placed in the docket

**Event Recorder/ Video Data**

Event recorder and video data report will be placed in the docket



## **CSX Response to the Accident**

On December 14, 2018, in response to the accident, CSX made rule modifications to operating rules dealing with welding frogs and switch points on controlled tracks. The directive was set forth in Sub System Bulletin No. 018; it states the following:

ITEM 1 - NEW OPERATING RULE 702 - REQUIREMENTS WHEN WELDING FROGS AND SWITCH POINTS ON CONTROLLED TRACKS

702.1 WHEN WELDING WILL BE PERFORMED ON A FROG OR A SWITCH POINT ON CONTROLLED TRACK THE EMPLOYEE-IN-CHARGE MUST:

1. CONTACT THE TRAIN DISPATCHER AND HOLD A JOB BRIEFING THAT MUST INCLUDE:

- A. THE MILE POST LOCATION OF WORK
- B. AMOUNT OF TIME NEEDED TO COMPLETE THE WORK
- C. LINE UP OF TRAINS THAT MAY APPROACH OR TRAVERSE THE WORK LOCATION

2. OBTAIN AN EC-1E LINE 1 AUTHORITY IF POSSIBLE,

3. PLACE A 10 MPH TEMPORARY SPEED RESTRICTION AT THE WORK LOCATION BEFORE THE WORK BEGINS UNTIL WORK IS COMPLETED

4. IF NECESSARY, TO UTILIZE WATCHMAN/LOOKOUT THE WATCHMAN MUST:

A. REMAIN IN POSITION SO THEY CAN PHYSICALLY TOUCH THE EMPLOYEE BEING PROTECTED

B. UTILIZE MAXIMUM AUTHORIZED TIMETABLE SPEED FOR THE PURPOSES OF SIGHT DISTANCE

ITEM 2 - MODIFY RULE 705.3 NUMBER 2

THE FOLLOWING RULE 705.3 NUMBER 2 HAS BEEN REPLACED BY THE FOLLOWING:

2. ALL EMPLOYEES CAN REACH AN ESTABLISHED PLACE OF SAFETY AT LEAST 15 SECONDS BEFORE A TRAIN OR ON-TRACK EQUIPMENT REACHES THE LOCATION, REFERENCING MAXIMUM TRACK SPEED, AND THE PLACE OF SAFETY MUST BE DOCUMENTED ON THE JOB BRIEFING FORM.

ISSUED BY OPERATING RULES DEPARTMENT

**End of Report**

I have read and approve the report

Tomas Torres  
Investigator-in-Charge  
National Transportation Safety Board

    //s//     Date: 12/27/2019

Robert Gordon  
Rail Accident Investigator  
National Transportation Safety Board

    //s//     Date: 12/27/2019

Michael Hoepf  
System Safety Investigator



