National Transportation Safety Board

Railroad Accident Brief

CSX Transportation Employee Fatality

Chattanooga, Tennessee

April 13, 2019

The Accident

On April 13, 2019, at 5:40 p.m. local time, a CSX Transportation (CSX) carman was struck and killed by a remote control locomotive (RCL) operating in a remote control zone (RCZ) at the Wauhatchie Rail Yard in Chattanooga, Tennessee, during a switching maneuver at the north end of the yard.[1] The accident carman was on foot crossing the lead track in the RCZ at the time of the accident.[2]

The train, Y292-13, consisted of two locomotives, both of which were RCLs, and three railcars. (See figure 1.) The two RCLs were coupled together with the forward ends facing each other. The rear end of the lead RCL was at the front of the train consist when operating north. The train had one remote control operator (RCO) who was riding on the rear of the third car of the train.[3]

[1] (a) All times in this document are local time unless otherwise noted. (b) A *remote control locomotive* is a locomotive that uses a radio link operated by a person not physically within the confines of the locomotive cab as defined in 49 *CFR* 229.5. (c) *Switching service* refers to the classification of freight cars; assembling of cars for train movements; unloading, or weighing; or moving of rail equipment in connection with work service that does not constitute a train movement as defined in 49 *CFR* 232.5. (d) *Remote control zone* (RCZ) means one or more tracks within defined limits designated in the timetable special instructions, or other railroad publication, within which remote control locomotives, under certain circumstances specified in this part, may be operated without an employee assigned to protect the pull-out end of the remote control movement, i.e., the end on which the locomotive is located, as defined in 49 *CFR* 218.93.

[2] For more detailed information about this accident investigation, see the public docket at www.ntsb.gov/investigations/dms.html and search for accident number RRD19FR005.

[3] A *remote control operator* (RCO) is a person who utilizes an operator control unit (OCU) in connection with operations involving a RCL with or without railcars as defined in 49 *CFR* 229.5.

Figure 1. Photograph of the train involved in this accident.

The accident carman was instructed by the yardmaster, the person responsible for the control of trains and engines operating within the yard, to work and inspect the railroad cars on tracks 7 and 11. After completing work on these tracks, the accident carman entered a truck that was parked between tracks 11 and 12 and drove across a nonpublic crossing to park near the north lead track. Simultaneously, the RCO was attempting to pull north out of track 14 onto the north lead when the carman's vehicle crossed in front of the lead locomotive. The RCO stopped abruptly to allow the vehicle to clear the nonpublic crossing. The truck cleared the crossing and parked adjacent to the lead track.

After the truck cleared, the RCO resumed his movement northbound. The accident carman then exited the truck and walked to track 11 (crossing the north lead) to remove a blue signal between the rails on north track 11.[4] Surveillance video reviewed by NTSB investigators showed that after removing the signal, the carman turned toward the track 11 switch to remove a lock, walked north and crossed the north lead track with his back to the approaching locomotive.[5]

[4] (a) 49 *CFR* 218.23 requires that blue signals be displayed in accordance with 218.25, 218.27, or 218.29 by each craft or group of workers prior to their going on, under, or between rolling equipment and may only be removed by the same craft or group that displayed them. A blue signal was required to be displayed at the track 11 switch.

[5] Each manually operated switch providing access to the track on which the equipment is located must be lined against movement to that track and locked with an effective locking device.

The RCO, proceeding on the north lead toward the track 11 switch, reached a speed of 9 mph. At that time, the carman, crossing the north lead on foot with his back to the lead locomotive, was struck and killed. (See figure 2.)

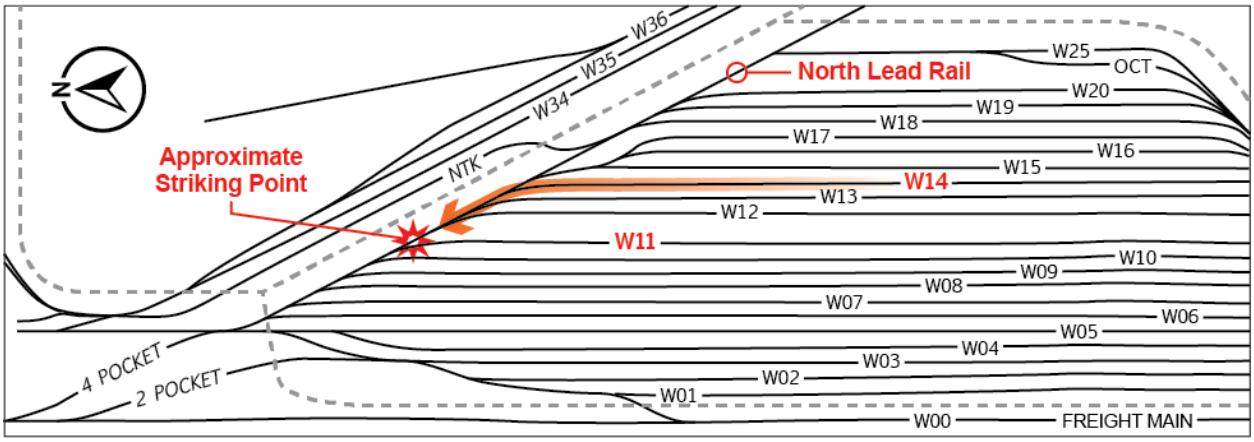

Figure 2. Diagram of the north end of Wauhatchie Rail Yard depicting track 11, track 14, the north lead, and the striking point.

Before the Accident

The RCO went on duty at 3:00 p.m. local time on April 13, 2019 and was assigned yard job Y292-13 at Wauhatchie Rail Yard. The RCO took charge of the RCLs and told National Transportation Safety Board (NTSB) investigators he visually confirmed personnel and obstructions were not occupying the lead track and established the RCZ. (See appendix A for CSX operational rules pertaining to RCZs.)

A group of workmen consisting of two carmen, one being the accident carman, went on duty at 3:00 p.m. local time on April 13, 2019.[6] The accident carman oversaw their assigned duties and was instructed by the yardmaster to work and inspect the railroad cars on tracks 7 and 11.

Equipment

NTSB reviewed the records for the daily mechanical inspections that were completed on the RCLs which did not reveal anything out of the ordinary.[7] Qualified personnel performed all the prescribed tests, the tests were performed at the appropriate locations, and required documentation was maintained. The pre-accident maintenance of the equipment did not reveal anything remarkable.

Postaccident Inspections

On April 16, 2019, NTSB investigators met at the Wauhatchie Rail Yard. CSX provided an RCO to perform a daily startup test with the equipment involved in this accident. During this process, communication, emergency brake application, bell function, man-down feature, and

[6] *Group of Workmen* - Two or more workmen of the same or different crafts assigned to work together as a unit under a common authority and who are in communication with each other while working.

[7] The daily inspection requirements are outlined in 49 *CFR* 229.21.

throttle and brake application and release were tested.[8] The group then examined the two RCLs and three railcars. The brakes applied and released on the locomotives without exception, and the brake components showed normal wear patterns on the entire consist. Postaccident inspections of the equipment did not disclose any defective condition that was attributable to the accident.

The RCO

According to the RCO's occupational medical records from CSX, he underwent a post-offer examination in July 2011 that included a series of questions about previously diagnosed medical conditions, review of recent medication use, evaluation of vital signs, hearing and vision tests, strength and physical capability testing, a urine dip test for sugars and protein, and a physical examination.[9] No chronic medical conditions, regular medication use, or physical abnormalities were identified.

Following recovery from a non–work-related right lower leg fracture in March 2014, the RCL operator was found medically qualified to return to work in July 2014. Hearing and vision testing in May 2017 was marked as "annual." The RCO met the requirements of 49 *CFR* 240.121, and was declared medically qualified with no restrictions/full duty.[10] The Wauhatchie Rail Yard was the home terminal for the RCO; he received more than the statutory off-duty period prior to reporting for duty on the day of the accident.[11] The Federal Railroad Administration's (FRA) postaccident blood alcohol and urine drug tests for the RCO were negative.[12]

Accident Carman

According to occupational medical records from CSX, the carman underwent a post-offer examination in September 1994 that included a series of questions about previously diagnosed medical conditions, review of recent medication use, evaluation of vital signs, hearing and vision tests, strength and physical capability testing, a urine dip test for sugars and protein, and a physical examination. Other than wearing contact lenses, no chronic medical conditions, regular medication use, or physical abnormalities were identified.

The carman received annual hearing tests, multiple respirator fit tests, and several vision tests as part of employment with CSX for return to work or other screening, such as the hearing

[8] If more than one OCU is assigned to a locomotive control unit, the secondary OCU's man down feature, bell, horn, and emergency brake application functions shall remain active as described in 49 *CFR* 229.15. The remote control system shall be designed so that if the signal from the OCU to the RCL is interrupted for a set period not to exceed five seconds, the remote control system shall cause: (i) A full service application of the locomotive and train brakes; and (ii) the elimination of locomotive tractive effort.

[9] Pre-offer, an employer may ask about an applicant's ability to perform job functions, their non-medical qualifications, or to describe or demonstrate how they would perform job tasks. Overall, employers are not permitted to ask questions that are disability-related or require "medical" examinations. Post-offer, the rules are quite different. After a provisional offer has been made, many of the above restrictions are removed, as long all potential employees in the job category are subjected to the same process.

[10] To be certified as a locomotive engineer vision and hearing shall meet or exceed the standards prescribed in 49 *CFR* 241 appendix F.

[11] For additional information on Hours of Service of Railroad employees refer to 49 *CFR* Part 228.

[12] As part of FRA's postaccident toxicology testing, Quest laboratory tested the RCO's urine for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, opiates/opioids, phencyclidine, tramadol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine; his blood was tested for ethyl alcohol.

conservation program. The carman passed all medical exams and was found to be medically qualified to perform his duties.

The carman's most recent medical evaluation was a fit for duty/return to work evaluation in June 2017. The carman had been off work for about 18 months following an off-duty fall from which he experienced neck, back, shoulder, and hand pain. At the June 2017 evaluation, the carman provided yes responses in the medical systems review for gout, wearing glasses/contacts, and high blood pressure. On the questionnaire, the carman denied excessive use of alcohol and that alcohol or other drugs had ever caused any problems in his life. The carman stated that his medications included allopurinol (used to treat gout, a type of arthritis caused by uric acid deposits in joints), esomeprazole (a prescription or over the counter medication used to treat gastric reflux), and lisinopril and amlodipine (both used to treat high blood pressure). None of these medications are considered impairing. The carman was 6 foot three inches tall and weighed 265 pounds. There were no abnormal findings for corrected vision, hearing, urine dip stick, and physical exam. The carman was found medically qualified to return to work with the restriction that he must wear corrective lenses/glasses while on duty.

The CSX chief medical officer stated that the carman's drug testing for the post-offer examination in September 1994 and for the return-to-work examination in June 2017 were negative, and nothing was reported in the employee assistance program files about participation in any substance abuse program.

Medications found in the carman's personal vehicle included three of the prescription medications that he reported in his June 2017 return to work evaluation: allopurinol, esomeprazole, and lisinopril. Also found were non-impairing prescription medications for relief of acute gout flares: prednisone, colchicine, and the non-steroidal anti-inflammatory medications indomethacin and ibuprofen.

Accident Carman Toxicology

Postaccident toxicology testing was conducted by the Federal Aviation Administration (FAA) Forensic Sciences Laboratory; no blood was available for testing.[13] Testing detected ethanol in brain (0.172 grams per hectogram [gm/hg]), liver (0.054 gm/hg), kidney (0.138 gm/hg) and lung (0.100 gm/hg).[14] FRA postaccident toxicology testing of the carman's vitreous fluid was negative for tested drugs and positive for ethanol (0.218 grams per deciliter [gm/dL] or 0.22 percent).[15]

Ethanol is a social drug commonly found in beer, wine, and liquor that acts as a central nervous system depressant. After absorption, ethanol is quickly distributed throughout body tissue and fluids uniformly, paralleling the water content and blood supply of each organ. Thus, because of its higher water content, the vitreous fluid would have about 12 percent more ethanol than the

[13] The FAA Forensic Sciences Laboratory tests specimens for over 1,300 compounds including toxins, prescription and over-the-counter medications and illicit drugs; information about these compounds can be found at the Drug Information website https://jag.cami.jccbi.gov/toxicology/.

[14] Grams per hectogram in tissue samples are directly comparable to grams per deciliter in liquid samples.

[15] As part of FRA's postaccident toxicology testing, Quest laboratory tested the carman's vitreous fluid for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methadone, methamphetamine, opiates/opioids, phencyclidine, tramadol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, pheniramine, and ethyl alcohol.

blood.[16] Although ethanol may also be produced in the body after death by microbial activity, vitreous is less susceptible to postmortem changes.

Unlike many other substances, ethanol is eliminated from the body at a fairly constant rate. The rate varies with the regularity of drinking and whether the individual has been eating, and ranges from 0.010 gm/dL/hour in infrequent drinkers with an empty stomach to as high as 0.035 gm/dL/hour in heavy drinkers who have eaten. In moderate drinkers, 0.015 gm/dL/hour is a reasonable average elimination rate of alcohol from blood.[17]

While the effects of ethanol can vary depending on an individual's frequency of use and tolerance, in general, at blood ethanol concentrations as low as 0.02 gm/dL there is relaxation and some loss of judgment and at 0.05 gm/dL there is further degradation of judgment, psychomotor functioning, and alertness. At concentrations of 0.08 gm/dL or above, an individual is considered legally impaired to operate a motor vehicle in all 50 states. At blood ethanol concentrations above 0.10 gm/dL, there is prolonged reaction time, altered perception of the environment, lack of coordination, slowed thinking, and mood and behavioral changes. Above 0.15 gm/dL, individuals may have significant loss of muscle control and major loss of balance. In addition to worsening motor coordination and disorientation, at concentrations above 0.20 gm/dL, individuals may experience amnesia or blackouts and double vision.[18]

The carman's prior alcohol use history is unknown, but it appears that he may have developed a tolerance to alcohol. Humans develop tolerance when their brain adapts to compensate for both behavior and body function effects from a given level of alcohol. Tolerance can include a diminished effect with continued use of the same amount. Many of the outward and obvious signs of intoxication may not be displayed, and tolerance does not develop at the same rate for all the effects.[19]

Given the carman's vitreous alcohol concentration, the calculated blood alcohol concentration (BAC) would be about 0.182 gm/dL. For a man of his weight, if all alcohol was consumed in one period an hour before his death, the maximum BAC would be about 0.20 gm/dL. This would be equivalent to drinking about 520 milliliters (17.5 fluid ounces) of 40 percent alcohol by volume (ABV) bourbon or rye whiskey. With a BAC of 0.182 gm/dL, the carman would have been legally intoxicated at the time of the accident. At this BAC, a person would be considered too impaired to operate a motor vehicle and would experience prolonged reaction times, altered perception of the environment, slowed thinking, and worsening motor coordination. In this case, despite his blood alcohol concentration, the carman performed several of his focused duties, but he appeared to have ignored safe operations in rail yards and did not maintain general situational awareness.

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[16] FAA. Update 1/16/2019. Forensic Toxicology Drug Information. Ethanol. https://jag.cami.jccbi.gov/toxicology/DrugDetail.asp?did=60.

[17] Jones AW. 2010. Evidence-based survey of the elimination rates of ethanol from blood with applications in forensic casework. Forensic Sci Int. 200:1-20.

[18] (a) Centers for Disease Control and Prevention. Blood Alcohol Concentration (BAC). https://www.cdc.gov/motorvehiclesafety/pdf/bac-a.pdf; (b) Vonghia L., et al. 2008 Acute alcohol intoxication. European Journal of Internal Medicine 19: 561–567.

[19] National Institute of Alcohol Abuse and Alcoholism. April 1995. Alcohol and Tolerance. No.28 PH 356 https://pubs.niaaa.nih.gov/publications/aa28.htm.

Random Drug Testing

The FRA issued a notice of proposed rulemaking (NPRM) titled "Control of Alcohol and Drug Use: Coverage of Mechanical Employees and Miscellaneous Amendments," on January 8, 2021.[20] Developed in response to a congressional mandate in the Substance Use-Disorder Prevention that Promotes Opioid Recovery and Treatment for Patients and Communities Act (SUPPORT for Patients and Communities Act), the FRA's proposed rule would, in part, expand the scope of its alcohol and drug regulation in Title 49 Code of Federal Regulation (*CFR*) Part 219 to cover mechanical employees who test or inspect railroad rolling equipment. In a response to the NPRM, the NTSB stated that it believed that the proposed rule's inclusion of mechanical employees in FRA mandated alcohol and drug testing programs is a step in the right direction. In this accident, the carman would have been subjected to the requirements of the alcohol and drug regulations proposed in FRA's expanded regulations. The NTSB believes expanded requirements of drug and alcohol testing for mechanical employees in safety sensitive positions, such as the carman, will prevent accidents and casualties in railroad operations that result from impairment of employees by alcohol or drugs.

Probable Cause

The NTSB determines the probable cause for the CSX Transportation employee fatality in the Wauhatchie Rail Yard was the inability of the carman to maintain situational awareness in the remote control zone due to the intoxicating effects of alcohol.

For more details about this accident, visit the NTSB Accident Dockets link and search for NTSB accident ID RRD19FR005

Report Date: June 28, 2021

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[20] 86 Federal Register 1418

Appendix A

902 - Remote Control Zones

902.1 Special instructions identify remote control zones and must include:
1. Location of zone(s),
2. Limits of zone(s),
3. Whether remote control zone signs are used and how they must be displayed,
4. Requirements of any switches or derails that must be locked, and
5. Method used to make highway-rail and pedestrian crossings at grade inaccessible, if applicable.

902.2 When a yardmaster is on-duty, the remote control operator foreman must receive permission from the yardmaster to activate a remote control zone.

902.3 Prior to activating a remote-control zone, a member of the crew that will utilize the zone must visually determine:
1. Tracks are clear,
2. No roadway worker protection or blue signal protection is active on the tracks,
3. Switches and derails are properly lined and locked, if required,
4. All highway-rail and pedestrian crossings are made inaccessible, and
5. Remote control zone signs are displayed, if used.

902.4 Once activated, a remote control zone is under the control of the remote control operator foreman. The remote control crew who activated the zone may make movements within the limits of the zone without providing protection.

902.5 In active remote control zones, only the remote control operator foreman can grant permission for other employees or equipment to:
a. Foul or occupy tracks, or
b. Cross a road or pedestrian crossing.

Effective April 1, 2017