



National Transportation Safety Board

Railroad Accident Brief

Union Pacific Railroad Employee Fatality

Kansas City, Kansas

The Accident

On September 29, 2015, at 11:15 a.m. central daylight time, Union Pacific Railroad (UP) remote control train YAR-24R-29 struck and fatally injured a foreman conducting switching operations at the east end of Armourdale Yard in Kansas City, Kansas.¹ The foreman was found in the gage of track 5 under the lead railcar.² A second switching crew foreman working in the yard was operating the striking train. There was no property damage. The sky was partly cloudy and the temperature was 70° F.

Narrative

At the time of the accident, a yardmaster was on duty, and two switching crews were working in the Armourdale Yard. The yardmaster, who was working in the yard office, had conducted job and safety briefings with both crews at the start of their respective shifts. The switching crews were working at opposite ends of the yard. The crew working on the west end of the yard (west crew)—a foreman, a helper, and a switch tender trainee—had gone on duty at 7:59 a.m.³ The west crew was operating remote control train YAR-24R-29.⁴ The crew working on the east end of the yard (east crew)—a foreman, a helper, and a switch tender—had gone on duty at 7:30 a.m. The east crew was operating remote control train YAR-48R-29.⁵ Both crews were aware of each other, but they were communicating via hand-held radios on different channels.⁶ The crews had tested all assigned equipment before going on duty, and found no problems.

Each crew had been assigned two remote control locomotives (RCL) and two remote control units (RCU), which were used to operate the RCLs. The RCUs were updated equipment that had been distributed that morning. A UP trainer had provided both crews with on-the-job training for the new RCUs at the start of their shifts and remained on site to answer any questions. A UP supervisor had conducted an observational qualification test with the switch tender trainee using the new RCU before the west crew began working. The foreman and helper positions on

¹ (a) All times in this brief are central daylight time. (b) *Switching* means moving (pushing or shoving) railcars to other yard tracks in a specific order based on their destinations.

² *Gage* is the distance between the inner sides of the parallel rail heads of a railroad track.

³ A *foreman* serves as the crew leader, providing instructions to the other crewmembers about switching assignments. A *helper* assists the foreman with remote control train operations. A *switch tender trainee* (or *switch tender*) ensures the equipment the crew is moving does not extend past the yard boundaries.

⁴ Train YAR-24R-29 consisted of two remote control locomotives (RCL) pushing 5 railcars against 31. RCLs are operated by radio signals emitted from a hand-held remote control unit (RCU), which is used by a person on the ground. There is no operator in the control cab of an RCL.

⁵ Train YAR-48R-29 consisted of two RCLs pushing 61 railcars.

⁶ If the crews needed to communicate with each other, one crew foreman would switch to the other crew's radio channel and talk to the other crew foreman.

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both crews had the RCUs. Only one person on each crew could control the RCLs at a time, but control could be alternated between the foreman and helper to facilitate switching operations. The west crew foreman and the east crew foreman were using the RCUs—that is, operating the remote control trains—when the accident occurred.

In the minutes before the accident, the east crew was pushing 61 railcars westward on track 6. The east crew foreman had ensured track 6 was clear. At the same time, the west crew was pushing 5 railcars eastward onto track 5, which already had 31 cars on it. Less than a minute after the west crew completed its switching movement on track 5, a man-down alarm was issued across all yard radio channels.⁷ All work in the yard stopped as members of the east and west crews tried to discern if they were receiving a legitimate or false man-down alarm. When the alarm did not stop, indicating a likely legitimate emergency, the crewmembers searched and found the east crew foreman dead in the gage of track 5. He was under the lead railcar of the equipment the west crew had been pushing toward the east end of the yard. (See figure.)

⁷ A *man-down alarm* is an audible warning transmitted over all local yard radio channels from an RCU, indicating the RCU is not in a vertical position and its operator may be in danger.

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Figure. Aerial view of Armourdale Yard and the accident site. (Photo by UP.)

Emergency services were immediately called. Kansas City emergency services responded, including the Kansas City Police Department and the Wyandotte County Coroner. All surviving train crewmembers were transported to North Kansas City Hospital for toxicological testing. Postaccident Federal Railroad Administration (FRA)-required toxicological testing was conducted by Quest Laboratories and all results were negative for alcohol. However, the west crew foreman, who was operating the striking locomotive remotely, tested positive for a prescription medication,

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Adderall, that was later reported by the medical review officer (MRO) as negative.⁸ Additionally, the east crew switch tender was found to have the potentially impairing sedating antihistamine diphenhydramine in the urine sample, but not the blood sample.⁹

The fatally injured east crew supervisor's postaccident FRA toxicology tests, conducted by Quest Laboratories, was negative for drugs and alcohol, but FAA Bioaeronautical Sciences Research Laboratory testing detected a cholesterol-lowering medication that is generally not considered to be impairing.¹⁰ His autopsy determined the cause of death to be multisystem trauma and the manner of death was characterized as accidental. The autopsy did not identify any significant natural disease.

Armourdale Yard

Site

UP owns and operates Armourdale Yard, which is about 5 miles west of downtown Kansas City. The yard is about 2 miles long and nearly level. Yard switching operations solely involve moving loaded auto rack railcars, which are about 90 feet long and carry newly assembled trucks and automobiles for distribution throughout the country. Although there were security cameras at Armourdale yard, none of them captured the location or activities of the foreman immediately before or at the time of the accident.

Track

Armourdale Yard has 21 tracks, the longest of which is about 1 mile. Most of the tracks are straight for their entire length. However, tracks 1 through 8 are slightly curved at the west end. All tracks have a slight dip in the center to keep railcars from rolling out onto the switching leads located at the east and west ends of the yard. The switching leads are areas of track used to guide railcars onto the different tracks to assemble trains throughout the yard.

Yard Office

The Armourdale Yard office is in a building at the far west end of the yard. The yard office consists of the yardmaster's office and a crew room. Whenever switching crews are working in the yard, a yardmaster is on duty in the yard office. The yardmaster's office does not provide a direct view of any yard switching operations.

⁸ An MRO is a licensed physician who is responsible for receiving and reviewing laboratory results generated by an employer's drug testing program and evaluating medical explanations for certain drug test results. The MRO found the explanation for the use of amphetamine acceptable and sent a report that the test was effectively negative.

⁹ Under FRA standards, the reporting cutoff for diphenhydramine in blood is 50 ng/ml.

¹⁰ (a) Quest Laboratories testing included analysis for alcohol, amphetamine, barbiturates, benzodiazepines, cannabinoids, cocaine, MDMA/MDA, methamphetamine, methadone, opiates/opioids, phencyclidine, tramadol, brompheniramine, chlorpheniramine, diphenhydramine, doxylamine, and pheniramine. (b) The Bioaeronautical Sciences Research Laboratory tests specimens for over 1,300 compounds; information about these compounds can be found the Drug Information web site (<http://jag.cami.jccbi.gov/toxicology/>).

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Remote Control System

The UP remote control system at Armourdale Yard has two basic parts: (1) a locomotive control unit, which is permanently installed on the locomotive, and (2) an RCU, which employees use to operate the locomotive. Radio signals transmitted from an RCU are used to control a locomotive, such as making it change direction and speed up or slow down. The UP had been using this type of remote control technology in the Kansas City area for about 10 years before the accident.¹¹

The Investigation

All equipment involved in the accident was inspected and tested postaccident. No defects were found; all equipment operated as intended.

The NTSB investigation revealed that UP had updated its remote control system at the Armourdale Yard the day of the accident, replacing the locomotive control units and the RCUs that had been in use for the previous 10 years.¹² As the switching crews went on duty, a UP on-the-job trainer instructed both the east and west crews in the new RCU initialization process and demonstrated how to operate it. After the training session, the trainer remained in the yard office to be available to answer any questions.

Through examination and interviews, the NTSB found that the new RCUs performed the same functions as the old RCUs, but there were subtle differences in the ways the new RCUs operated. However, there was no available evidence indicating the east crew foreman was affected by those differences. Therefore, the NTSB could not determine whether the east crew foreman's use of the new RCU was a factor in the accident.

Employee Qualifications and Operating/Safety Rule Compliance

Title 49 *Code of Federal Regulations (CFR)* Parts 240 and 242 require that locomotive operators (like the east and west crew foremen who were operating the remote control trains in this accident) be trained and certified under a federally approved program. As part of this training program, employees must pass required testing to show that they are qualified to safely operate an RCL. The NTSB reviewed UP records and found that the UP had an approved training plan in place and that all of the train crewmembers involved in this accident had received the required annual training and retraining. These records, in addition to interviews conducted with UP managers, confirmed that the crewmembers operating the remote control trains involved in the accident held current certifications for their assigned positions. All of the UP employees the NTSB interviewed stated that they were well aware of the dangers of working in a railroad yard environment, but they felt comfortable with the level of training that they had received.

Title 49 *CFR* Part 217 further requires that each railroad have an approved program to periodically conduct operational tests and inspections to determine the extent of compliance with

¹¹ Class I railroads had been using this type of remote control technology for about 15 years before this accident.

¹² UP had begun replacing the system in all of its Kansas City yards about 2 weeks before the accident. The old system was a CANAC remote control system. The new system was a General Electric remote control system.

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its operating rules, safety rules, and special instructions. UP's *General Code of Operating Rules* (GCOR), effective April 1, 2015, and *Safety Rules*, effective July 2, 2013, provide safety rules governing the safe switching of cars in a yard.¹³ Specifically, the safety rules require that an employee remain clear of the track and use the designated walking path between tracks. Also, as part of their initial employment training, UP employees receive training on yard safety before they are allowed to perform any duties around yard tracks.

An NTSB review of UP operational testing and inspection records for the 12 months preceding the accident for all of the crewmembers involved found the following:

West Crew

The west crew foreman, who was operating the striking train at the time of the accident, had been tested 144 times; a UP supervisor had to counsel the foreman 3 times concerning compliance issues. The west crew helper had been tested 161 times; in 2 instances, a UP supervisor had to counsel the helper concerning compliance issues. The west crew switch tender trainee had been tested 86 times; a UP supervisor had to counsel the switch tender trainee 3 times concerning compliance issues.

East Crew

The east crew foreman, who was fatally injured in the accident, had been tested 127 times with no instances noted concerning compliance issues. The east crew helper had been tested 135 times; in 6 instances, a UP supervisor had to counsel the helper concerning compliance issues. The east crew switch tender had been tested 131 times; a UP supervisor had to counsel the switch tender 3 times concerning compliance issues.

All of the train crewmembers involved in the accident had received the necessary operational training and testing to properly perform their duties. Still, the east crew foreman was struck in the gage of track 5 while on duty. The NTSB recognizes that railroad operating and safety rules only provide guidance and best practices, they do not guarantee personal safety. Therefore, Proper operational training and testing does not always guarantee personal safety during switching operations in a railroad yard.

Human Performance

West Crew

The west crew foreman, who was operating the striking train at the time of the accident, had been receiving treatment by a physician with Adderall (amphetamines/stimulants) for 4 years prior to the accident, and the medication was detected by postaccident toxicology testing. During

¹³ (a) Union Pacific Railroad, *General Code of Operating Rules*, Seventh Edition (Omaha, Nebraska: Union Pacific Railroad, 2015). (b) Union Pacific Railroad, *Safety Rules* PB-20369-L (Omaha, Nebraska: Union Pacific Railroad, 2013).

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this investigation, NTSB found no evidence that the west crew foreman was impaired in his ability to operate the train nor his ability to work as expected with his crewmembers and supervisor.

East Crew

The east crew foreman, who was fatally injured in the accident, had high blood pressure and elevated cholesterol, which were treated by a physician with nonimpairing medications. Postaccident toxicology testing identified Atorvastatin—the nonimpairing cholesterol-lowering medication. Additionally, his autopsy found no evidence of natural disease.

The east crew switch tender reported using two prescription medications that could be impairing, but her work activities were not consequential to the accident. Toxicological testing found antihistamine diphenhydramine in her urine sample, but not at reportable levels in her blood.

Finally, the east crew helper was prescribed a number of medications, including a potentially impairing antihistamine that would not be detected on postaccident toxicology tests. However, his postaccident toxicology test was negative. NTSB found no evidence to suggest that the actions of the helper contributed to the accident.

Radio Communications

On the day of the accident, the east and west crews were communicating on different radio channels. In NTSB postaccident interviews, crewmembers stated that the practice of using different radio channels for each crew was a drawback to Armourdale switching operations. Although it may have reduced radio congestion, using different radio channels isolated the crews from each other. Neither crew knew exactly what switching move was being conducted at the other end of the yard, unless the crew foreman switched radio channels and contacted the other crew foreman directly, or communicated through the yardmaster. Because the two switching crews were operating on different radio channels, neither crew was aware of the other crew's switching movements in the yard.

Man-Down Alarms

A man-down alarm is an audible warning transmitted over the local yard radio channels from an RCU, indicating the RCU is not in a vertical position and its operator may be in danger. In NTSB postaccident interviews, multiple UP employees commented negatively about the frequent number of noncritical man-down alarms transmitted over the Armourdale Yard radio channels. They stated that man-down alarms occurred often; primarily due to remote control operators bending over during normal work activities. Several employees also stated that there was no way to differentiate between noncritical man-down alarms, such as when an employee bent over to throw a switch while wearing the RCU, and a critical man-down alarm, such as when an employee was hurt and lying on the ground.

Additionally, UP's GCOR Operating and Train Handling Rules and Special Instructions require that remote control operators confirm that the man-down alarm emitted from the RCU that

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he or she is assigned works before using the RCU on duty.¹⁴ These required tests contribute to the number of noncritical man-down alarms are broadcast throughout the Armourdale Yard.

The NTSB is concerned about the frequent number of noncritical man-down alarms broadcast throughout the Armourdale Yard. These noncritical messages likely reduced the attention and reaction crewmembers made to actual, critical alarms. A man-down alarm is intended to convey a need for immediate reaction and attention to an emergency situation. The noncritical man-down messages dilute the priority given to these types of messages. Therefore, the NTSB recommends that UP develop and implement a modification to the existing man-down alarms that allows yard workers to reliably differentiate between legitimate and noncritical man-down messages from RCUs.

UP Postaccident Actions

Following the accident, UP took actions to improve communications and coordination between switching crews working in Armourdale Yard. UP changed yard radio channel assignments so that all switching crews and the yardmaster now communicate on one common yard radio channel, thereby fostering direct, shared communication among all employees on duty. UP further required that one crewmember of all switching crews must now be assigned to work at the opposite end of the track onto which a crew is pushing railcars, thereby enhancing coordination and awareness among crews working on switching assignments on nearby tracks from opposite ends of the yard.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the east crew foreman being in the gage of the track for unknown reasons while a train switching movement was being performed by another crew. Contributing to the accident was the inadequate radio communications and work coordination between the crews working in the yard.

Recommendation

As a result of this investigation, the National Transportation Safety Board makes the following safety recommendation:

To the Union Pacific Railroad:

Develop and implement a modification to the existing man-down alarms that allows yard workers to reliably differentiate between legitimate and noncritical man-down messages from remote control units. (R-17-031)

¹⁴ Title 49 *CFR* Part 240 also requires such tests.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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Adopted: December 29, 2017

For more details about this accident, visit the [NTSB investigations page](#), and search for NTSB accident identification number **DCA15FR017**.

The NTSB has authority to investigate and establish the facts, circumstances, and cause or probable cause of a railroad accident in which there is a fatality or substantial property damage, or that involves a passenger train. (Title 49 *United States Code (USC)* Section 1131 - *General authority*)

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” Title 49 *Code of Federal Regulations*, Section 831.4. Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 *USC* 1154(b).
