



National Transportation Safety Board

Railroad Accident Brief

Train Collision with End of Track
Felton, California

The Accident

On December 28, 2015, about 11:55 a.m., Pacific standard time, a Roaring Camp & Big Trees Narrow Gauge Railroad (RCBT) tourist/excursion train struck a wooden bumper at the end of a switchback track in Felton, California.¹ The train had 39 passengers, six of whom received minor injuries. The weather at the time of the accident was partly sunny with the wind out of the east at 5 miles per hour (mph) and the temperature was 49°F.



Figure 1. Accident location at the end of the switchback.

¹ (a) Although the term *gage* is used in the railroad industry, RCBT spells it *gauge*. (b) A *switchback track* is a zig-zag section of railroad track used mainly in mountainous territory to gain elevation in a limited amount of territory.

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The crew arrived on time for the 90-minute round trip from the Roaring Camp passenger depot. The engineer said that he had manipulated the throttle lever several times during the trip and did not have any problems. He said that when he pulled the train into the switchback track, he continued further than normal to allow the passengers a better view of a trestle structure that was part of the original railroad.² The switchback track could hold a six-car train (including the locomotive) from the switch to the end of the track. The engineer said that he reduced the throttle when the train was about 50 feet from the end of the track. The engineer explained that, typically, the train would stop when he placed the throttle in idle because of the ascending grade, and he would then apply the locomotive (independent) brake. The engineer stated that on the day of the accident, however, the throttle did not return to idle, and the locomotive continued to pull the train about 3 to 5 mph until it struck the wooden bumper at the end of the track. The engineer said that he pulled the emergency engine stop lever, but the train did not respond. He stated that he did not recall ever using the emergency engine stop lever before. He said that he then reached for a pneumatic switch that would disengage the clutch, but by then the train had stopped after colliding with the wooden bumper at the end of the track.³

The conductor and some of the passengers were riding in the caboose at the time of the accident. When the train traveled further on the switchback than the conductor expected, he radioed the engineer to stop, but it was too late. The conductor said that he felt the sudden stop when the train collided with the wooden bumper, but did not fall and was not injured. A passenger sitting sideways at the front of the caboose broke the window after hitting her head against it.

The conductor stated two additional passengers complained of injury in the passenger car. The conductor returned to the caboose, communicated with the railroad operations manager about the accident, and requested medical attention for some of the passengers upon return to the passenger depot.⁴

An off-duty locomotive engineer assisted in rescuing the accident train. A steam locomotive that was prepared for the next train tour pulled the accident train back to the passenger depot, which took about 30 minutes.

Local emergency responders met the train at the passenger depot. Emergency responders treated three injured passengers on scene; three others were transported to a local hospital.

Investigative Factors

Passenger Safety Announcements

The conductor stated that he always broadcasted a scripted safety announcement on the train public address system before each train trip. However, railroad supervisors stated the safety announcements were not regularly monitored to ensure consistency amongst train crews. During a postaccident interview, the conductor said that one of the instructions he provided to the passengers was to remain seated at all times when the train was moving. Several injury reports

² The railroad was originally built with a corkscrew trestle bridge that was destroyed in a 1976 fire. The switchback track was built following the destruction of the trestle bridge.

³ Disengaging the clutch releases the locomotive drive gear from the locomotive engine power.

⁴ The train was not accessible to emergency responders at the accident location.

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from the accident indicated that passengers were standing and then fell to the floor when the train suddenly stopped.

Railroad Operations

The Roaring Camp Railroads, Inc., which constructed the RCBT in 1963 as a replica of an 1880s-era logging railroad, operated a tourist/excursion train over a track route of about 1.5 miles. In addition to the RCBT, Roaring Camp Railroads, Inc. also runs the Santa Cruz, Big Trees & Pacific Railway (SCBG). The SCBG is a standard-gage railroad connected to the general railroad system and is regulated by the Federal Railroad Administration (FRA) and the California Public Utilities Commission (CPUC).⁵ The RCBT is a narrow-gage railroad, not connected to the general railroad system, and not regulated by either the FRA or the CPUC.

The RCBT has 20 employees assigned to work on the trains, four of whom are part-time or seasonal. Each of the 20 employees have different assignments and qualifications. Not all of the RCBT-qualified operating crewmembers could operate on the SCBG because they did not meet all of the certification requirements for engineers and conductors working on railroads regulated by the FRA.⁶

At the time of the accident, SCBG followed BNSF Railway's updated version of the *General Code of Operating Rules (GCOR)*, effective April 1, 2015, and the Union Pacific Railroad *Safety Rules*, effective July 2, 2013.⁷ The RCBT had its own operating rulebook, but no specific safety rules for operations.

Safety Oversight

The California Department of Industrial Relations Division of Occupational Safety and Health (DOSH), Amusement Ride and Tramway Unit has regulations to govern permanent amusement ride operations in California.⁸ The state regulations were separated into three sections: the labor code, administrative regulations, and technical regulations. The technical regulations contain references to several *American Society for Testing and Materials* standards which were enforced as law in California. Prior to the accident, the Amusement Ride and Tramway Unit had not exercised regulatory oversight of the RCBT.⁹

⁵ SCBG is the official FRA-designated reporting mark for this railroad.

⁶ See Title 49 *Code of Federal Regulations (CFR)* 240 and 242 for additional information.

⁷ BNSF Railway Company, *General Code of Operating Rules*, Seventh edition, effective April 1, 2015, (Fort Worth, Texas: 2015); Union Pacific Railroad, *Union Pacific Railroad Safety Rules*, effective July 2, 2013, (Omaha, Nebraska: 2013).

⁸ State of California, Department of Industrial Relations Division of Occupational Safety and Health, Amusement Ride Unit, *Permanent Amusement Rides Administrative Regulations*, Title 8, Chapter 3.2, Article 6, Sections 344.5 - 344.17, and *Permanent Amusement Ride Safety Orders*, Title 8, Chapter 4, Subchapter 6.2, Sections 3195.1 - 3195.14.

⁹ DOSH does not have regulatory authority over the SCBG.

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Train Crew Information

Locomotive Engineer

The 68-year-old engineer was originally hired as a student fireman on August 22, 1998, and completed the fireman training on October 17, 1998. On September 20, 1999, he converted from a part-time employee to a full-time employee, and on September 6, 2007, he was promoted to locomotive engineer.

Train Conductor

The 68-year-old conductor was hired on a seasonal basis on May 20, 1988. His personnel files did not contain other relevant information.

Mechanical Information

Train Equipment

A throttle lever at the top of the control stand in the locomotive cab controlled the locomotive speed and operated the clutch ahead of the torque converter. (See figure 2.) Twisting the throttle handle would apply a friction shoe and hold the throttle lever in any desired position.



Figure 2. Locomotive control stand.

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The passenger car and caboose involved in this accident were built specifically for the Roaring Camp Railroad tourist operations in the mid-1960s. Roaring Camp Railroad, Inc. acquired a used locomotive that was first put in service in 1958.

Train Inspections

The train crewmembers stated that they performed a Class I air brake inspection and general safety check of their train before beginning their trip. The train crew did not note any defects and did not document the predeparture inspection.

On January 5, 2016, the train consist was reassembled as it was on the day of the accident and an air brake test was performed. The air brakes and control valves operated as intended and air leakage was determined to be minimal. This test exceeded the requirements for an FRA Class I air brake test.

The throttle assembly, connecting rods, and governor mechanism were inspected for proper operation, as well as the pneumatic clutch control valves and emergency stop lever. All of the systems functioned as intended.

Postaccident testing of the control stand determined that the friction shoe prevented the throttle lever from returning to the idle position when the throttle lever was twisted, applying the friction shoe. As designed, the friction shoe would not allow placement of the throttle lever in idle while engaged. The only way to recreate the scenario from the day of the accident, as described by the engineer, was by applying the friction shoe on the throttle lever and attempting to manipulate the throttle lever back to the idle position. However, the friction shoe prevented the engineer from returning the throttle lever to the idle position. No exception to the operation of the throttle lever was noted.

During the postaccident interview, the engineer stated that when he operated the locomotive, he usually used his hand to hold the throttle lever in the desired position instead of using the friction shoe. The throttle lever did not have any indications or markings to indicate to the engineer when the friction shoe was engaged.

On January 6, 2016, a complete running gear and brake component inspection was conducted on the accident train. Mechanical deficiencies were noted on the locomotive, passenger car, and caboose, but the deficiencies were determined to not be causal or contributory to the accident.

Postaccident Actions

DOSH Amusement Ride Unit

Following the accident, DOSH began exercising its jurisdiction and initiated the process to certify RCBT in accordance with California regulations for permanent amusement ride properties. In its December 29, 2015, amusement ride field inspection report, DOSH ordered that RCBT place the train equipment involved in this accident out of service pending specific corrective action. DOSH released the locomotive for service on January 12, 2016, after a follow-up inspection. DOSH released the passenger car and caboose on March 9, 2016, following an inspection.

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Roaring Camp Railroads

Following the accident, RCBT began following the GCOR. In addition, RCBT issued a rulebook on air brake and train handling that duplicated the guidance for SCBG, and employees for both RCBT and SCBG received training and testing on the new rules.¹⁰ RCBT now requires train crewmembers to meet the same training and testing requirements as the ones for SCGB—that comply with FRA regulations for railroads connected with the general railroad system.

In addition, train engineers must continue to perform and document locomotive daily inspections. Also, train conductors are required to document predeparture terminal inspections of train equipment.

Prior to allowing the accident train engineer to return to work, RCBT provided him with remedial hands-on training on the use of the various emergency stop systems on the locomotive, including using the emergency engine stop lever, emergency brake, pneumatic clutch control valves, and throttle. Conductors received additional training on the requirement that they consistently make safety announcements reminding passengers they must remain seated during the train ride. RCBT also implemented a requirement that the train be stopped if passengers refuse to remain seated while riding the train. In addition, Roaring Camp Railroads has implemented a program of announced and unannounced (efficiency) testing for operating crewmembers which is closely based on the FRA requirements for regulated railroads found in Title 49 *Code of Federal Regulations (CFR)* Part 217. RCBT also implemented a requirement that train crews stop their trains at the switchback where this accident occurred as soon as the rear of the train is clear of the switch.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the engineer's application of the throttle lever friction shoe that prevented the throttle lever from being placed into the idle position and his failure to stop the train by using the emergency engine stop lever or pneumatic clutch control valves before the collision with the wooden bumper at the end of the track.

¹⁰ Roaring Camp & Big Trees Narrow Gauge Railroad, *Timetable & Special Instructions, Air Brake & Train Handling*, effective February 29, 2016 (Felton, California: 2016).

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For more details about this accident, visit www.nts.gov/investigations/dms.html and search for NTSB accident identification DCA16FR002.

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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. (49 U.S. Code § 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.” 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 *United States Code*, Section 1154(b).
