



National Transportation Safety Board  
Washington, D.C. 20594

Railroad Accident Brief

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Accident No: DCA-04-FR-012  
Railroad: Alton and Southern Railway Company  
Train: Remote Control Train YAS313  
Location: East St. Louis, Illinois  
Accident date: September 21, 2004  
Accident time: 3:15 a.m. central daylight time<sup>1</sup>  
Type of Accident: Remote control collision in hump classification yard and hazardous materials release  
Fatalities/Injuries: None  
Property Damage: \$607,365

## Synopsis

On September 21, 2004, about 3:25 a.m., central daylight time, the Alton and Southern Railway Company<sup>2</sup> remote control train YAS313 derailed during switching operations at the east end of the Gateway Hump Yard in East St. Louis, Illinois. The remote control operator was unable to control the speed of the train as it crested the hump.<sup>3</sup> As the train entered track 066, it collided at 9.6 mph with a tank car containing vinyl acetate. During the collision and subsequent derailment, vinyl acetate began to leak from two tank cars and the cargo from both cars caught on fire.

About 140 people from the surrounding neighborhood were evacuated, and work at the hump yard was suspended. The evacuation order was lifted about 6:00 a.m. No injuries were reported. The weather was clear, about 67° Fahrenheit, with light winds from the south-southeast. It was dark at the time of the accident, but the area was well lit with stadium type lighting.

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<sup>1</sup> All times in this report are central daylight time.

<sup>2</sup> The Alton and Southern Railway Company is a wholly owned subsidiary of the Union Pacific Railroad (UP).

<sup>3</sup> In a *hump* switching operation, freight cars are switched by pushing the cars up a hill, or hump. As the cars crest the hump, a remote control operator uncouples them. The uncoupled cars then roll down the other side of the hump on a 2.8 percent average grade into predetermined tracks. The hump crest operator designates which car will go into each track through a series of automatic switches and speed control retarders. A *retarder* is a track-mounted device that controls the speed of freight cars as they roll over the device. At this location, the retarders were hydraulically operated and controlled either manually or by the hump computer, which assists in the operation of the hump.

## The Accident

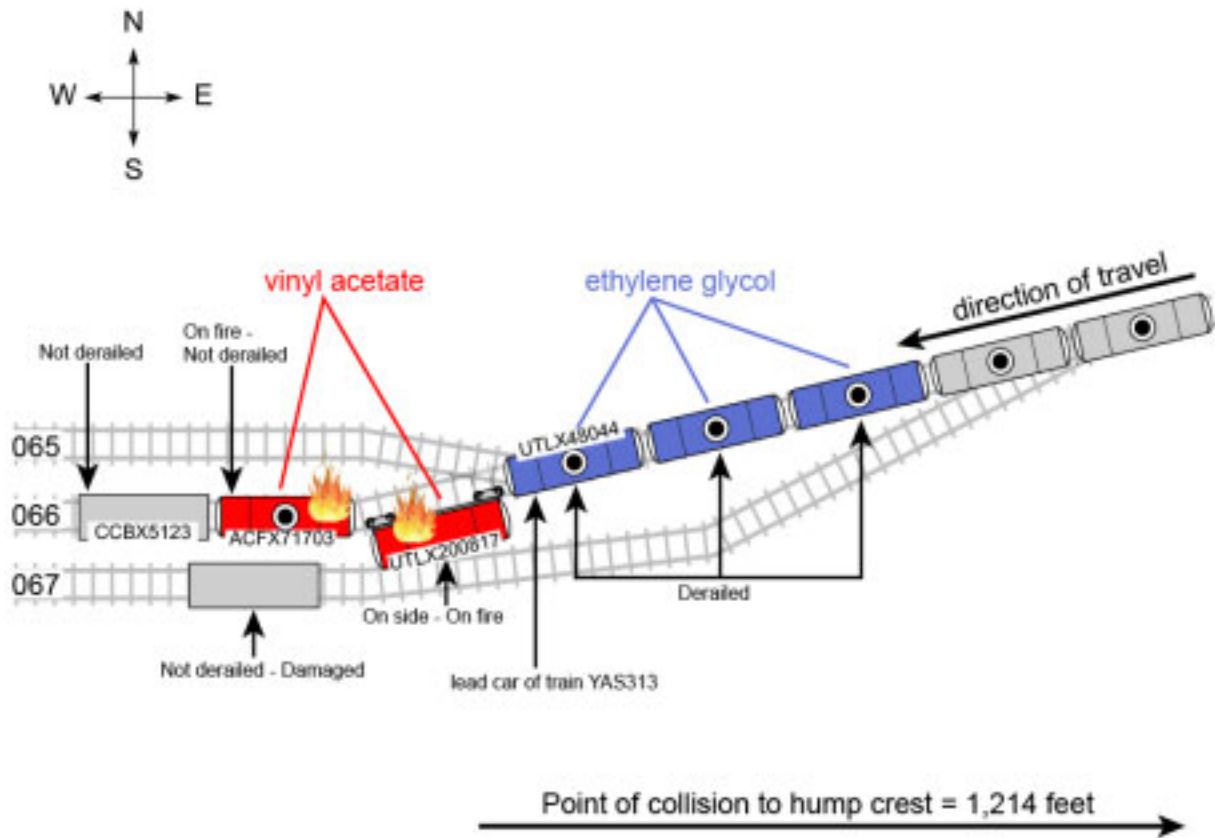
Train YAS313 consisted of 71 cars and 2 SD-40 locomotives equipped for remote control locomotive (RCL) use, which were operated by a conductor and a remote control operator. At the time of the accident, the conductor was on the trailing locomotive, and the remote control operator was on the ground operating the RCL. A hump operator gave instructions to the train crew and controlled the retarders and switches.

The hump operator told the train crew to hump the 71-car train. At one point during the hump switching operation, the hump operator instructed the train crew to stop the operation at the 48th car, and the crew complied. The hump operator then called the signal maintainer and reported that cars were getting out of the retarders too fast. Some cars had rolled through their assigned tracks and were blocking the west end of the yard. The signal maintainer used the hump computer to reduce the speed of the cars. Then hump switching resumed for three more cars (49th through 51st). The first car, CCBX5123, a loaded gondola, stalled in track 066 and blocked the entrance to track 065. The next two cars, tank cars UTLX 048044 and ACFX 71703, routed to track 065, were redirected by the computer-aided antiblocking circuitry to track 066. The hump operator instructed the train crew to stop hump switching again and couple the three cars from track 066 to the train and bring them back up to the hump for reclassification.

The remote control operator walked down the hump to the three cars on track 066 while the conductor remained seated in the cab of the trailing locomotive. The hump operator had placed the hump controls into trim mode, in which all retarders are off line, and lined the route manually from the hump crest to track 066. The conductor switched the RCL controls on the locomotive from hump mode to normal mode.

The remote control operator requested 4 mph via his remote control device and started moving the remaining 20 cars of the train (52nd through 71st) over the hump. After the cars had traveled about 800 feet, the remote control operator noticed that they were moving too fast. He used the remote control device to request “coupling speed” and asked the hump operator to apply the master retarder manually. The remote control device then indicated an overspeed condition, and it automatically made a full service brake application of the locomotive’s independent brakes. The remote control operator saw the cars continue for about 300 more feet and said he heard the retarders being applied.

The 20-car train struck the first of the three stopped cars on track 066. (See figure 1 for a diagram of the collision and subsequent derailment.) The lead wheels of the first car in the train (tank car UTLX 048044) lifted as the car struck the first stopped car (tank car UTLX 200817), which contained vinyl acetate. UTLX 200817 was near, but not coupled to, the second stopped car (tank car ACFX 71703), which also contained vinyl acetate. When the train struck UTLX 200817, the two vinyl acetate tank cars (UTLX 200817 and ACFX 71703) missed coupling and their shelf couplers breached each other’s tanks, and UTLX 200817 rolled onto its side. Subsequently, the cargo from both cars—26,000 gallons of vinyl acetate each—caught on fire. In addition, the lead three cars of the train, all of which were tank cars containing ethylene glycol, derailed. These tank cars derailed in line and were not punctured or involved in the fire.



**Figure 1.** Diagram of collision and subsequent derailment.

## Train Control

The train crew started work by performing the daily inspection of the two RCLs, and they signed the inspection cards with no exceptions taken. Postaccident inspection of the locomotives and the remote control system did not identify any brake deficiencies or anything remarkable with the remote control system.

The remote control operator stated that he could not control the speed of the train as it crested the hump even though it appeared that he followed all the operating rules that were in place for that operation. According to railroad employees and their union representatives, hump train crews frequently need to stop hump switching operations to clear cars that are blocking assigned tracks or to retrieve misdirected cars. They also agreed that the ease or difficulty of train control depends on the length and weight of the train on the hump.

Initial investigation determined that the weight of the 20 cars of train YAS313 exceeded the braking capability of the RCL's independent brakes on the hump. The Alton and Southern Railway Company arranged for a simulation<sup>4</sup> of the accident so it could review

<sup>4</sup> Alton and Southern Railway Company contracted with Rail Sciences Inc. to model the accident train and simulate the events of the accident. The effects of the hump retarders were not reproduced in the simulation.

humping operations. The simulation used a model of a train traveling 4 mph at brake initiation with two SD40-2 locomotives; 2,427 trailing tons; a length of 1,061 feet; and the braking ability of the two locomotives on an average 2.8 percent descending grade. The simulation indicated that the train could not be controlled on the 2.8 percent descending grade using the locomotive brakes alone. When the train was between 600 and 700 feet from the crest of the hump, it accelerated even with the independent locomotive brakes applied with 56 pounds per square inch of brake cylinder pressure. The simulation further indicated<sup>5</sup> that the braking ability of two SD40-2 locomotives could stop a train with no more than 900 trailing tons on a 2.8 percent descending grade.

## **Postaccident Actions**

The Alton and Southern Railway Company has implemented the following changes for operating RCLs during hump switching operations at the East St. Louis Gateway Hump Yard:

- Smaller groups, or blocks, of cars are maneuvered over the hump instead of heavy strings of cars.
- The tonnage operated over the hump is limited to 900 trailing tons.
- Before moving a block of cars over the hump, the RCL operator and hump operator are required to have a job briefing and to determine whether the assistance of the retarders is needed and, if so, to determine the necessary retarder application: light, medium, or heavy.
- An additional train crew is assigned to move cars that have stopped short of their target tracks and switch cars that are not to be humped.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of the September 21, 2004, accident at the Alton and Southern Railway Company's Gateway Hump Yard in East St. Louis, Illinois, was the inability of the remote control operator to control the speed of the cars being switched as they crested the hump because the weight of the cars exceeded the braking capability of the remote control locomotives. Contributing to the accident was the failure of the Alton and Southern Railway Company to have weight limits and adequate hump operation procedures in place for maneuvering heavy strings of cars over the hump.

**Adopted: June 27, 2005**

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<sup>5</sup> The simulation did not capture all the variables that may have been present at the time of the accident, including the added braking of the retarders and the 72 pounds per square inch of brake cylinder pressure.