

SUMMARY FOR FE-13-06
SELECTED AND POSSIBLE CONTRIBUTING FACTORS

SELECTED FACTORS

Railroad: Norfolk Southern Corporation (NS)

Location: Chicago, Illinois

Region: 4

Month: August

Date: Aug. 25, 2006

Time: 12:54 p.m., EST

Data for Fatally Injured Employee(s)

Conductor

43 years old

13 years of service

Last rules training: Feb. 8, 2006

Last safety training: Aug. 9, 2006

Last physical: Nov. 28, 2005

Last relevant efficiency training: July 25, 2006

Data for All Employees (Craft, Positions, Activity)

Craft: Transportation and Engine

Positions:

NS Train Crew Assignment BR 17

Locomotive Engineer

Conductor

Brakeman

Train Master

Activity

Switching

EVENT

A Conductor was fatally injured when struck by on-track equipment while attempting to apply a hand brake on moving equipment, during a switching operation.

SUMMARY FOR FE-13-06 CONTINUED**POSSIBLE CONTRIBUTING FACTORS****PCF No. 1**

The Conductor violated a railroad operating rule by stepping between moving rail equipment in an attempt to make an adjustment.

PCF No. 2

The rail cars that struck the Conductor were set in motion by a mismatch coupling.

PCF No. 3

In non-compliance with railroad operating rules, the Conductor used a brake stick to apply a hand brake on a rail car with a bent brake wheel.

PCF No. 4

The Conductor failed to apply a hand brake to both rail cars involved in the incident, in non-compliance with NS Timetable 4, which requires one hand brake for one car and two hand brakes for two cars.

PCF No. 5

The Conductor received no training by NS in operation of the brake stick.

PCF No. 6

The railroad's efficiency testing did not include compliance with railroad rules regarding getting on and off equipment or use of the brake stick.

REPORT: FE-13-2006

RAILROAD: Norfolk Southern Corporation (NS)

LOCATION: Chicago, Illinois

DATE & TIME: Aug. 25, 2006; 12:54 p.m., EST

EVENT¹: A Conductor was fatally injured when struck by on-track equipment while attempting to apply a hand brake on moving equipment, during a switching operation.

EMPLOYEE:

Craft:	Transportation and Engine
Occupation:	Conductor
Age:	43 years
Length of Service:	13 years
Last Rules Training:	Feb. 8, 2006
Last Safety Training:	Aug. 9, 2006
Last Physical:	Nov. 28, 2005
Last Relevant Efficiency Test:	July 25, 2006

CIRCUMSTANCES PRIOR TO THE ACCIDENT

On Aug. 25, 2006, at 7:42 a.m., an NS train crew assignment BR 17 reported for duty at the NS Calumet Yard located in Chicago, Illinois. The BR 17 assignment consisted of three crew members: a Locomotive Engineer, a Conductor, and a Brakeman. All crew members arrived on time and prepared themselves for work at the main Calumet Yard office. All crew members were off duty in excess of the statutory requirements. Prior to commencing the day's work, the BH 17 crew received a job safety briefing from the Train Master. This safety briefing focused on the use of personal protective equipment, specifically the situations in which the use of hearing and eye protection is required. After completion of the job safety briefing, the Yard Master informed the BH 17 crew of work assignments for the day. The crew members reviewed their assignments and discussed among themselves how the work would be accomplished.

¹ "Event" is defined as "occurrence that immediately precedes and directly results in the fatality." Possible contributing factors are identified in the following report and attached summary.

The first assignment for the BH 17 crew was to switch out Yard Track 28. This was completed at approximately 11:45 a.m. The BH 17 crew members could not complete the second task assigned due to a blue flag being displayed on a track where they were going to switch. The crew members decided to proceed to their last assignment which was to switch out a group of 13 rail cars and one dead-in-tow locomotive.

To complete their switching assignment, the BH 17 crew members utilized two different tracks. The first track, where the cars were currently located, was referred to as the Derrick Track. The second track, where the cars would be organized, was called the Engine House Lead. The tracks are parallel to each other in a northwest to southeast direction. There are approximately 40-foot track centers between the two tracks until the Derrick Track merges into the Engine House Lead on both ends. These tracks are located near the Calumet Yard Car Shop, which is centered in the Calumet Yard Complex. The Engine House Lead has a slight 0.14 percent descending grade in a northwest direction. (The grade percentage was taken from the NS Calumet Yard Situation Survey Plan and Profile TRM-2006-8.)

The BH 17 crew members coupled NS Locomotive 6677, which was facing southeast, to 13 cars and one dead-in-tow locomotive on the Derrick Track. They then contacted the Train Master on duty and requested that a brake stick be delivered to their location. At Calumet Yard, NS rules require the use of a brake stick when applying hand brakes. The brake stick was delivered to the crew by the Train Master at approximately 12:30 p.m. The BH 17 crew held a job briefing and discussed how the 13 cars and the dead-in-tow locomotive would be switched and the responsibilities of each crew member during the switching.

A brake stick is a steel tube with a hook type shape, located at the point of the tube. The brake stick is approximately four feet in length and has telescoping capabilities to extend to approximately eight feet in length. The brake stick allows an individual to remain on the ground as opposed to climbing equipment to apply or release manual hand brakes.

The BH 17 crew began switching by placing the Derrick Track's head car, SOU 65785, a load of scrap rail, to the Engine House Lead. This movement was completed using train line air pressure. Once SOU 65785 was on the Engine House Lead, the Conductor used the brake stick to apply the hand brake on the car. The application of the hand brake was prior to the BH 17's locomotive cutting away from the SOU 65785. When BH 17's locomotive was uncoupled, the car's air brakes were applied. SOU 65785 was now left standing alone on the Engine House Lead with the hand brake and the air brakes applied. From this point forward, the event recorder data from NS Locomotive 6677 indicates that the BH 17 crew did not use train line air pressure during the remainder of its switching assignment. The crew proceeded back to the Derrick Track and coupled to the 12 cars and the dead-in-tow locomotive. At this point, the Conductor prepared the 12 cars and locomotive for switching by removing all hand brakes and bleeding the air from the cars.

Bleeding the air is a term used to describe the method for a total release of a railroad car's air brake system. A bleed rod is pulled to empty the car's main and emergency air reservoir. This

action allows railroad cars to be moved freely, without air brake pressure applied to the wheels, unless an alternate method of securement is applied to the car, i.e. handbrake, chock, etc.

After the Conductor completed preparing the cars for movement, BH 17 pulled off the Derrick Track and proceeded back to the Engine House Lead. The last car on the Derrick Track, NS 292165, which was an empty covered hopper, was coupled to the SOU 65785 on the Engine House Lead Track. No hand brake was applied to the NS 292165. The two cars now stood coupled together, B end to B end, on the Engine House Lead with one hand brake which was previously applied to the SOU 65785 by use of the brake stick.

BH 17 returned to the Derrick Track and set out the dead-in-tow locomotive, NS 5227. The Conductor secured the locomotive. Afterwards, the Conductor uncoupled from the NS 5227 and began pulling southeast off the Derrick Track.

The Locomotive Engineer was operating NS Locomotive 6677, seated on the right side of the cab in a southeastern direction. The Brakeman was located on the northeast side of the Engine House Lead Track near the Derrick Track and the Engine House Lead switch. The Conductor was located on the ground between the Derrick Track and the Engine House Lead in the vicinity of the NS Locomotive 5227, which he had just secured on the Derrick Track.

The weather was mostly cloudy and hot with low humidity. The temperature was approximately 79° F. The wind was out of the southwest at approximately 10 mph.

THE ACCIDENT

After pulling in a southeast direction, the BH 17 cleared the Derrick Track Engine House Lead switch and was stopped by the Brakeman. The Brakeman then lined the switch for the Engine House Lead and requested “3-Step Protection” to manually open the knuckle of box car QC 75072. After opening the coupler, the Brakeman proceeded to cross over to the southwest side of the Engine House Lead. The Brakeman then released the “3-Step protection” to the Engineer, and hand signaled to the Conductor to take over control of the train’s movement. The Conductor instructed the Locomotive Engineer of BH 17, via radio, to shove five car lengths to a coupling. The BH 17 Locomotive Engineer began to shove 11 cars in a northwest direction on the Engine House Lead. The Conductor continued to control the movement via radio and was counting the cars down to a stop. At this point, the 11 cars came in contact with the two cars standing on the Engine House Lead. However, the 11 cars failed to couple to the two standing cars. The momentum from the failed coupling started the two cars rolling free in a northwest direction. The Conductor then instructed the BH 17 Locomotive Engineer to shove an additional three cars to attempt another coupling.

Railroad rolling stock equipment is designated to have an A end and a B end. The B end is designated as the front end of the equipment and is identified by the location of the hand brake. The A end is the opposite end of the equipment. This does not include locomotives, as the nomenclature system of identifying ends are different.

Before coupling, a train service employee should make a request to the Locomotive Engineer not to move the locomotive until the request has been released by the requesting employee. This is after air brakes are set, the generator field switch is turned off, and the reverser is centered.

Shortly after the shoving movement commenced, the Brakeman assumed a squatting position in order to view the Conductor on the opposite side of the cars. The Brakeman did not observe the Conductor falling to the ground between the two rail cars, SOU 65785 and NS 292165. However, the Brakeman did observe the Conductor underneath the B end of the NS 292165 and witnessed the left wheels (Northeast side) of NS 292165 running over the Conductor. The Brakeman immediately contacted the Locomotive Engineer and instructed him to stop the train. The Brakeman requested the Yard Master, at approximately 1 p.m., to notify Emergency Services and the NS Police. Emergency response personnel arrived at the scene of the accident at approximately 1:15 p.m. The Chicago Fire Department, the Chicago Police Department, and the NS Police Department also arrived at the scene. The Cook County Coroner's Certificate of Death indicates the Conductor was pronounced dead at the scene at 12:45 p.m.

POST-ACCIDENT INVESTIGATION

FRA Operating Practices and Motive Power and Equipment (MP&E) Inspectors arrived on the scene approximately two hours after the accident occurred. A mechanical inspection was completed on 13 cars and NS Locomotive 6677 by the MP&E inspectors. NS Locomotive 6677 was found to have broken cable insulation with exposed wires and an electrical cabinet cover removed. Two cars, NS 292165 and SOU 65785, were determined to be directly related to the accident. No mechanical exceptions were taken to NS 292165. However, SOU 65785 was found to have six defects. These exceptions were: a loose handhold on the B end, right side; a hand brake wheel with insufficient clearance (measured 1 inch); a hand hold with less than required clearance on the B end, left side at the top; a loose ladder on the A end, right side, bottom bracket; a loose ladder on the A end, top right, left brackets; a loose bottom hand hold; and an A end coupler height less than 31 ½ inches from the top of the rail (measured 31 inches). NS's subsequent inspection of the equipment revealed no additional mechanical or operational defects with either car.

Hours of service records were reviewed for the Locomotive Engineer, Conductor, and Brakeman for a period of 30 days prior to the accident. The Locomotive Engineer and Conductor were regularly assigned to BH 17. This assignment has an on-duty time of 7:42 a.m., with rest days on Monday and Tuesday. The Locomotive Engineer and Conductor both received an off-duty period of 14 hours and 56 minutes prior to going on duty the day of the incident. The Brakeman worked BH 17 on 11 occasions in the previous 30 days. All other assignments within the 30-day period had an on-duty time between 7 a.m. and 8 a.m. (NS operates on Eastern Time). The Brakeman did not work the BH 17 assignment on the day prior to the accident. The Brakeman had an off-duty period of 13 hours and 42 minutes.

After the accident, the Locomotive Engineer and Brakeman were interviewed by NS management, Chicago Police, and FRA.

This accident qualified for testing under Title 49 Part 219, Subpart C - Post-Accident Toxicological Testing. The Locomotive Engineer's, Brakeman's, and Conductor's remains were tested under this authority. The results of these tests were negative.

Analysis and Conclusions

When BH 17 initially set the SOU 65785 to the Engine House Lead, the Conductor applied the hand brake using a brake stick. The car's air brakes were also applied. At a point between the uncoupling of BH 17's locomotive from SOU 65785, and the attempted coupling of NS 292165 to the QC 75072, the Conductor bled off the air brakes from SOU 65785. No evidence exists that demonstrates a failure of the braking equipment on the SOU 65785 or NS 292165. The cars were set in motion by the mismatch coupling which suggests the hand brake pressure applied with the brake stick to secure SOU 65785 was insufficient to hold both rail cars.

The Conductor used a brake stick to apply the hand brake on the SOU 65785, which had a bent brake wheel. NS Safety Rule 1100 prohibits employees from using a brake stick to apply a hand brake on a bent or broken hand brake wheel.

When the NS 292165 was coupled to the SOU 65785, the Conductor failed to apply a hand brake to the NS 292165. This is not in compliance with NS Timetable 4, which requires one hand brake for one car and two hand brakes for two cars.

The exact action the Conductor took prior to being struck is not known. NS Rule GR 14 states: "Employees must not stand on tracks in front of closely approaching equipment or step between coupled moving cars or engines for any reason, and adjustment must never be made to moving equipment."

Event recorder data was downloaded, reviewed, and analyzed by NS management. FRA investigators reviewed the results and took no exception to this analysis. FRA utilized this data along with a Situation Survey and Profile Plan provided by NS to determine the location of the SOU 65785 and NS 292165 prior to their movement. This analysis shows a mismatch coupling between the A end of the NS 292165 and A end of QC 75072 occurred.

Efficiency testing records for the Conductor were reviewed from the period of Jan. 1 to Sept. 7, 2006. The Conductor was tested 181 times; six rule violations were recorded. The rule violations resulted in one letter of caution, one START Program, and four verbal warnings issued to the Conductor. During this period, NS managers did not test the Conductor for compliance with NS Safety Rule 1071 (Getting On and Off Equipment) or Safety Rule 1100(f) 11 (Use of the NS Brake Stick).

The START Program is a progressive performance improvement program used by NS. Efficiency testing records for the Chicago Terminal were also reviewed for the same period. NS managers conducted 59,608 rule tests and recorded 952 rule violations. Of the 59,608 checks conducted in the Chicago Terminal, 2,177 were on rules applicable to this incident with 49 violations recorded.

The training records for the Conductor indicate he successfully completed an operating and safety rules class on Feb. 8, 2006. FRA requested documentation of the Conductor's training on the NS Brake Stick. The NS management stated the Conductor most likely received the training several years ago. The NS managers were unable to produce any training records pertaining to the brake stick.

No hand brake was applied to NS 292165 and an insufficient amount of hand brake pressure was applied to the SOU 65785. These two conditions caused the cars to be set in motion after the mismatch coupling occurred. Evidence indicates the Conductor's hand held radio was placed on the B end sill platform of the NS 292165. Therefore, it is reasonable to conclude that the Conductor was between the rolling equipment prior to being struck and knocked down by NS 292165. The probable cause of this accident was the Conductor stepping between the coupled, moving cars, which is in non-compliance with NS Safety Rule GR 14.

APPLICABLE RULES

NS System Section
Northern Region
Timetable No. 4 In Effect at 12:01 a.m.
June 23, 2006
Modified by Dearborn Division
Operations Bulletin #29, Section -1, Item 11
In Effect at 12:01 a.m.
June 23, 2006

109-1 HAND BRAKE REQUIREMENTS: Car(s) left standing must be secured with hand brakes as follows:

One car: One hand brake

Two cars: Two hand brakes

Three or more cars: Two hand brakes plus a sufficient number of additional hand brakes to secure the cut of cars.

Except when setting a car off on a line of road with a defective hand brake, only one additional car with a good hand brake applied will be required.

These instructions are in addition to any outstanding instructions issued by proper authority, but do not supersede special instructions at terminals and yards.

NS Dearborn Division
Northern Region
Timetable Supplement No. 4-A
In Effect at 12:01 am.
June 23, 2006

DB-S-1 100(f)-I. BRAKE STICKS: Brake sticks are located at the following locations:

Saginaw Yard, Lansing, Michigan - Yard Master's Office
Jackson Yard, Jackson, Michigan - Furnace Room
Botsford Yard, Kalamazoo, Michigan - Yard Master's Office
Hugart Yard, Grand Rapids, Michigan - Break Room
Warner Yard, Monroe, Michigan - Crew's Office
Wayne Yard, Wayne, Michigan - Yard Master's Office

Use brake sticks for applying/releasing hand brakes, pushing the EDT button, turning angle cocks and adjusting retaining valves. All crews must have a brake stick available to be used during their tour of duty. Avoid climbing on or off equipment when brake stick can be utilized. Do not mount cars during inclement weather or when ice or snow is present on ladders, steps, crossover platforms or safety appliances.

NS Dearborn Division
Northern Region
Chicago Superintendent's Notice #1
In Effect at 12:01 a.m.
Jan. 1, 2006

Item 5(a) - HAND BRAKES: The use of brake sticks is mandatory for all NS employees in NS yards.

NS Safety and General Conduct Rules
Effective Dec. 30, 2002

GR 14 Employees must not stand on tracks in front of closely approaching equipment or step between coupled moving cars or engines for any reason. They must not step between or immediately in front of standing cars or engines unless necessary in the performance of duty and then only after arranging for protection against the equipment being coupled to or moved.

Never make adjustments to moving equipment.

1071 — GETTING ON OR OFF EQUIPMENT: Employees must mount or dismount equipment only when such equipment is standing, except in an emergency.

1100(f) 11. - USE OF THE NS BRAKE STICK: Do not use the brake stick to operate bent or broken brake wheels.