

Log R-637



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: October 23, 1992

In Reply Refer To: R-92-09

Mr. Arnold B. McKinnon
President and Chief Executive Officer
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About 8 a.m. on September 17, 1991, Norfolk Southern (NS) train 277, en route west from Fort Wayne, Indiana, to Chicago, Illinois, struck eastbound train 629 head-on at milepost (MP) 455.1 near Knox, Indiana. The accident occurred on the main track west of the Knox siding. One locomotive and four cars of train 277 and three locomotives and five cars of train 629 derailed. The engineer of train 277 was killed, and the conductor sustained serious injuries. The student engineer of train 277 and all three crewmembers on train 629 sustained minor injuries.¹

The National Transportation Safety Board determines that the probable cause of this accident was the failure, due to a lack of vigilance, coordination, and discipline, of the crew of train 277 to comply with the signals at Knox. Contributing to the accident was the inadequate supervision of the student engineer by the engineer and conductor.

The crew of train 277 went on duty (September 17), at 5 a.m. in Ft. Wayne, Indiana (MP 366). The crew consisted of an engineer, a conductor, and a student engineer. The engineer performed the required air brake test. At 5:22 a.m., the train departed East Wayne Yard westbound for Chicago, Illinois. The train comprised one locomotive unit and seven loaded container-on-flat-car (COFC) double stack cars. All three crewmembers rode in the control compartment of the locomotive, which was being operated with the long hood forward. The engineer operated from MP 366.3 to MP 419.8, at which location he allowed the student engineer to begin operating the train.

¹For more detailed information, read Railroad Accident /Incident Summary Report--"Knox, Indiana, September 17, 1991 " (NTSB/RAR-92/01/SUM).

The student engineer said that he saw signal A (MP 452; see figure 1), the "approach" signal for the east end of the Knox siding, and thought it was clear; he did not describe the combination of colors that the signal showed. He also said he assumed the engineer saw the signal because the engineer was standing behind him. According to the student engineer, neither he nor the engineer called out the signal as required by operating rule 34. The student engineer stated that "as far as I know" (but he was not sure), the conductor called the signal clear.

Signal B (MP 453.8), the signal for the west end of the Knox siding, was clear, according to the student engineer. The investigation showed, however, that signal B, which is a "remote control" signal controlled by the dispatcher, displayed a "stop" signal. Train 277 should have stopped at signal B, which governs movement of trains on the main track at the west end of the siding. The student engineer stated that he observed "green over red" (the color combination that signifies clear) on the left column of signal lights. He said that neither he nor the engineer, who was in the middle of the cab at the time, called the signal. The conductor had moved from the rear seat to the front seat on the left side, and he called "clear," according to the student engineer, who said the signal was clear as the train passed it. The student engineer reported that he did not notice which way the switch was lined (whether it was set to allow train 277 to proceed on the main track or to allow train 629 to enter the siding). He estimated the train's speed at 35 mph and increasing when the locomotive passed the signal and switch.

According to the conductor, the crew had called all signals before reaching the Knox siding. However, the conductor said that he did not call the signals at either end of the siding. He stated that he was in the washroom from the time the train approached the siding to just before the collision. He said that when he entered the washroom, the engineer was seated on the left side of the locomotive and was not standing behind the student engineer, as the latter reported. He stated that when he came out of the washroom, the train was on single track and had already passed signal B, and he observed the engineer standing in the middle of the locomotive cab.

The conductor and the student engineer saw a light after they had passed signal B and at first thought it was the reflection of the sun from a metal building. All three crewmembers then realized that it was a locomotive headlight. The student engineer applied the emergency brake and jumped off the south side of the locomotive. The conductor said that he and the engineer did not have time to get off; instead, they sat on the floor and braced for the impact.

After the accident, signal relay tests, the printout from the dispatcher's traffic control (TC) machine, and the dispatcher's log show that the dispatcher had set the signals and the switch at 7:35 a.m. to allow train 629 to enter the west end of the Knox siding. The dispatcher's action automatically changed signal A at the east end of the Knox siding to an approach aspect and changed signal B to a stop indication for train 277 on the main track at the west end of the siding.

Safety Board investigators found evidence in the TC computer log that train 277 failed to stop short of signal B: the log had recorded a change in the switch position and an occupancy of the track circuit over the switch when the train went through the switch. Thus, the investigation disclosed a lack of vigilance by the crew of train 277.

Train crewmembers are responsible for complying with the carrier's operating rules. The NS's operating rule 34 states in part:

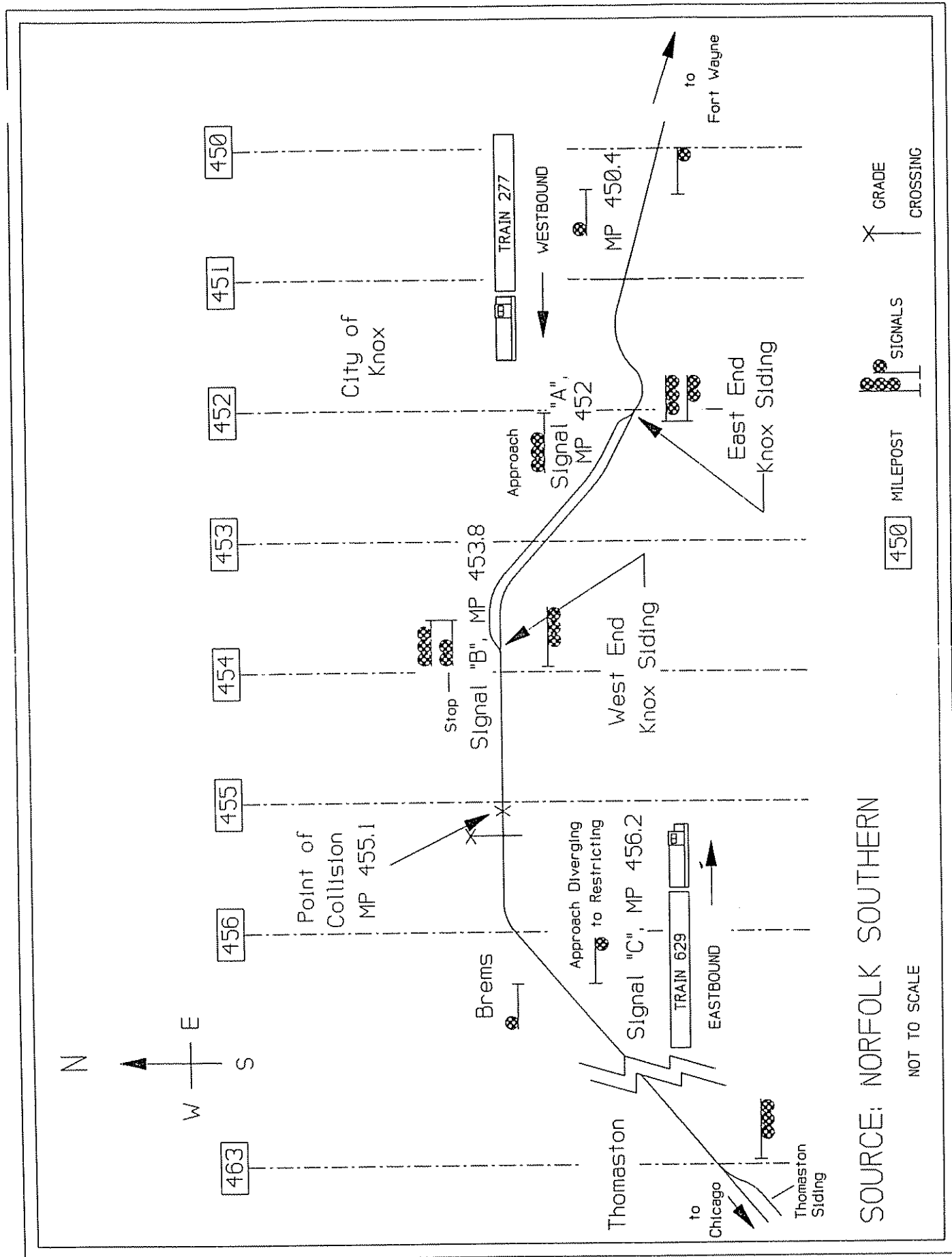


Figure 1.-- Knox siding.

The engineer must comply with the indication of each block, interlocking, and other signal that affects the movement. Crew members . . . must maintain a vigilant lookout for signals and conditions along the track that may affect the movement. Employees located in the operating compartment. . . must communicate to each other in an audible manner by its name the indication of each signal affecting the movement of their train or engine as soon as the signal is clearly visible. . . Each signal must be called. . . It is the responsibility of the engineer to have each employee comply.

The NS's operating rule 106 states, "The conductor, [and] engineer . . . are jointly responsible for the safety of the train. . . and for the observance of the rules." The conductor and engineer are required to instruct their crewmembers on performing in accordance with the rules. When necessary, the conductor and engineer must also take action to stop the train.

Because all three crewmen aboard train 277 failed to respond to either signal A or B, the investigators tested sight distance and visibility.

A traincrew in a locomotive that has a long hood forward has to be especially careful because the hood limits diagonal visibility. The fireman and the brakeman/conductor have seats on the left side of the cab. Their view of the right side of the track is severely limited, particularly in a right-hand curve, such as the one train 277 was making when it passed signal A. A crewman who wants to call out the signals, as rule 34 dictates, must move from the left side of the locomotive to a position behind the engineer, who sits on the right. From that position, the crewman can look out the engineer's window to see and confirm signals.

Safety Board sight-distance tests indicated that the student engineer, who was sitting on the right, could have seen signal A, but only for 934 feet. It was not possible for the conductor or the engineer of train 277 to see signal A from the left side of the locomotive. According to the TC log, the train's average speed was 29 mph, or 42.5 feet per second, on the main track from the east to the west end of the Knox siding. At this speed, the student engineer, as well as anyone standing behind him, would have had approximately 22 seconds to see the signal before going past it.

After the train passed signal A, signal B would have been visible to anyone sitting on the left side for 3,600 feet, or 90 seconds, and to anyone sitting on the right side for 2,400 feet, or 55 seconds.

Tests showed that the crewmembers should have had one other warning to stop before they reached signal B. When they were still 4,000 feet east of signal B, they should have been able to see the headlight of train 629 from both sides for about 14,000 feet.

The testimony of the student engineer and the conductor of train 277 conflicted. The former said that the engineer was standing in the middle of the cab and that the conductor was seated on the left side, suggesting that both men were poorly placed for viewing signal A. The student engineer did not indicate that the conductor had left his seat. However, the conductor testified that he was in the

locomotive's washroom when the train approached Knox, making it impossible for him to see the signals.

While on the ground following the collision, the conductor of train 629 stated that he talked to the student engineer of train 277. The former asked the latter, "What really happened? . . . Was you bull-----?" and the student engineer replied, "We were bull-----."

Because of the conflicting testimony of train 277's crewmembers, Safety Board investigators could not determine the exact position of each person as the train operated through Knox. The Safety Board concludes that the crewmembers of train 277 could have seen both signals, A and B, and that the sight distance was sufficient for proper train operations. Regardless of where they were in the locomotive, the crewmembers should have been vigilant and should have observed signals A and B.

The Safety Board concludes that had the crewmembers of train 277 been vigilant and had they observed the signals as they were required to do by rule 34, they could have stopped the train, using normal or emergency braking, before reaching signal B, even if they had not seen signal A; thus, they could have avoided the accident.

The engineer and the student engineer on train 277 had completed 11 training runs over this territory together between September 3 and September 15, 1991. The engineer knew that the student had a college education, a rarity in this craft, and he also knew that the student was one of the top pupils in the NS's school in Georgia. These factors, coupled with the fact that no unusual occurrences were reported during the training trips, may have led the engineer to be overly confident about the student's abilities. Consequently, the engineer may have relaxed his vigilance, even though he was an instructor engineer.

Even though the student had made 11 trips over the Knox territory, he was not qualified on the physical characteristics of the territory and may not have been watching for the signals. When Safety Board investigators interviewed him, he said he was unfamiliar with the territory. His unfamiliarity should have heightened his vigilance, as well as that of his supervisors (the engineer and the conductor), so that he would not be taken by surprise and would be prepared to respond to operational track situations.

Because of the long hood forward, the conductor and the engineer could not have seen signal A unless they were on the engineer's side of the cab looking forward. Moreover, in a locomotive with the long hood forward, it is difficult to see the control panel from any position other than in or directly behind the engineer's seat. Thus, the engineer and/or the conductor should have been on the right side of the cab when necessary to see signals blocked by the locomotive hood.

For several reasons, all crewmembers might have expected that the train would not be stopped at the Knox siding but would instead meet train 629 at Thomaston:

- o The conductor on train 277 may have overheard only part of the radio conversation between the train dispatcher and train 629. If he did not hear what the engineer of train 629 said, he possibly did not realize that the dispatcher had changed the meeting place from Thomaston to Knox.

- o Train 277 was a double-stack, COFC train which dispatchers usually handle on a priority basis.
- o Because the "approach" signal at MP 450.5 displayed a clear aspect, the crewmembers knew before reaching signal A that the track was lined to allow them to take the main track through the siding. This routing down the main track through the siding suggested that the train would be able to proceed without stopping because a train usually is not held on the main track when it is the first train to reach a siding.

Regardless of these circumstances, train 277 should have complied with signals A and B; crewmembers should have stopped the train at the "stop" signal displayed by signal B. Since the conductor and engineer were not properly positioned to see signal A, the crewmembers possibly missed the only available advance warning that they had to stop the train at signal B. Nonetheless, the crewmembers on train 277 did not comply with rules 34 and 106: the engineer and the conductor did not adequately supervise the student engineer, and none of them called the signals as they were required to do.

Good crew coordination is imperative, especially when one crewmember is receiving on-the-job training. The engineer had been an engineer for 19 years and had a very good performance record. He had been a successful instructor of student engineers during that time. However, in this case, the engineer and the student engineer apparently did not talk about the Knox siding, the speed and handling of the train, or the other operational subjects that one would expect them to discuss in a training situation. In fact, the engineer was neither vigilant nor in charge of operations as his responsibilities dictated.

The Safety Board concludes, based on the statements of both conductors and the student engineer, that there was inadequate crew coordination as the train approached the siding and that the conductor and engineer made little or no effort either to supervise the student engineer or to observe and confirm signals.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the Norfolk Southern Railway Company:

Review and revise your programs for traincrew supervision, locomotive cab discipline, and training of student engineers in light of the circumstances of this accident, and make necessary improvements. (Class II, Priority Action) (R-92-09)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation R-92-09 in your reply.

VOGT, Chairman, COUGHLIN, Vice Chairman, and LAUBER, HART, and HAMMERSCHMIDT, Members, concurred in this recommendation.



By: Carl W. Vogt
Chairman