

RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4146

CHICAGO AND NORTH WESTERN RAILWAY COMPANY

ICAGO, MILWAUKEE, ST. PAUL AND PACIFIC RAILROAD COMPANY

ELBERON, IOWA

MARCH 24, 1968

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

Washington, D. C. 20591

Summary

DATE:	March 24, 1968	
RAILROADS:	Chicago, Milwaukee, St Paul & Pacific	Chicago & North Western
LOCATION:	Elberon, Iowa	
KIND OF ACCIDENT:	Side collision	
TRAINS INVOLVED:	Freight	Freight
TRAIN NUMBERS:	Extra 1006 West	Extra 406 East
LOCOMOTIVE NUMBERS:	Diesel-electric units 1006, 1511, 1010	Diesel-electric units 406, 1615, 1687
CONSISTS:	73 cars, caboose	20 cars, ca- boose
SPEEDS:	61 m p h.	10-15 m p.h
OPERATION:	Interlocking	
TRACKS:	Single; tangent; 0 26 percent descending westward	Single; tangent level
WEATHER:	Clear	
TIME:	4:45 a m	
CASUALTIES:	1 killed; 2 injured	
CAUSE:	Failure of the engineer to stop the CNW train in accordance with an inter- locking Stop-signal indication, resulting in the CNW train colliding with the MILW train moving over the railroad grade crossing	

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION
RAILROAD SAFETY BOARD

RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4146

CHICAGO AND NORTH WESTERN RAILWAY COMPANY
CHICAGO, MILWAUKEE, ST PAUL AND PACIFIC RAILROAD COMPANY
MARCH 24, 1968

Synopsis

On March 24, 1968, a side-collision occurred between freight trains of the Chicago and North Western Railway Company and the Chicago, Milwaukee, St Paul and Pacific Railroad Company at a railroad grade crossing in Elberon, Iowa. One train employee was killed, and two were injured *

The accident was caused by failure of the engineer to stop the CNW train in accordance with an interlocking Stop-signal indication, resulting in the CNW train colliding with the MILW train moving over the railroad grade crossing

*This accident was investigated in conjunction with representatives of the Iowa State Commerce Commission

Location of Accident and Method of Operation

The accident occurred on that part of the Iowa Division of the Chicago, Milwaukee, St. Paul and Pacific Railroad (MILW) extending between Atkins Yard and Perry, Iowa, a distance of 121.7 miles, and on that part of the Minneapolis and St. Louis Division of the Chicago and North Western Railway (CNW) extending between Mason City and Belle Plaine, Iowa, a distance of 108.3 miles. In the vicinity of the accident the MILW is a single-track line over which trains operate by signal indications of a traffic control system. The CNW is a single-track line in the accident area. CNW trains operate in this area by timetable and train orders.

An automatic interlocking is at Elberon, 25.4 miles west of Atkins Yard and 99.4 miles south of Mason City. MILW and CNW movements through the interlocking are governed by signal indications of the automatic interlocking system. The MILW and CNW main tracks cross at grade within the interlocking.

The collision occurred within the Elberon interlocking, where the MILW and CNW main tracks cross at grade.

In the territory involved, MILW trains move eastward and westward by both timetable and geographical directions. CNW trains move eastward and westward by timetable direction but northward and southward by geographical directions. The latter directions are used in this report when reference is made to the CNW.

Elberon Interlocking Signals

Signals 264.3 and 1, governing westbound MILW movements through the Elberon interlocking are, respectively, 2.0 miles and 302 feet east of the railroad crossing. They are of the color-light type and are continuously lighted. The approach clearing circuit for these signals begins 3,292 feet east of signal 264.3, or 2.7 miles east of the crossing.

An approach signal and signal 2, governing southbound CNW movements through the interlocking are, respectively, 1.2 miles and 302 feet north of the railroad crossing. The approach signal is of the one-arm semaphore type and is continuously lighted with the arm fixed at a 45-degree angle in the upper quadrant. Signal 2 is of the color-light type and is approach lighted. The approach clearing circuit for signal 2 begins 2,997 feet north of that signal, or 3,299 feet north of the crossing.

The signal aspects applicable to this investigation, and the corresponding indications and names, are as follows:

<u>Signal</u>	<u>Aspect</u>	<u>Indication</u>	<u>Name</u>
2 (CNW) 1 (MILW)	Green-over-red	Proceed	Clear
2 (CNW) 1 (MILW)	Red-over-red	Stop before any part of train or engine passes the signal	Stop
Approach (CNW) 264 3 (MILW)	Yellow	Proceed prepared to stop before any part of train or engine passes the next signal. Trains exceeding 40 m p h must immediately reduce to that speed	Approach
264 3 (MILW)	Green	Proceed	Clear

In connection with the MILW and CNW movements involved in the accident, the circuits of the interlocking signals are so arranged that when a westbound MILW train enters the approach clearing circuit for MILW signals 264 3 and 1 before a southbound CNW train enters the approach clearing circuit for CNW signal 2, the Approach aspect displayed by MILW signal 264 3 changes to Clear and MILW signal 1 displays a Clear aspect. In this event, the CNW approach signal continues to display an Approach aspect, and CNW signal 2 displays a Stop aspect if a southbound CNW train enters the approach clearing circuit of that signal.

If a southbound CNW train passes the CNW approach signal and enters the approach clearing circuit for CNW signal 2 before a westbound MILW train enters the approach clearing circuit for MILW signals 264 3 and 1, CNW signal 2 displays a Clear aspect, and MILW signals 264 3 and 1 display Approach and Stop aspects, respectively.

Time and Weather

The collision occurred at 4:45 a m , in clear weather

Tracks

From the east on the MILW main track there are, in succession, a long tangent, a 1000' curve to the left 3,006 feet, and a tangent 4,214 feet to the railroad crossing and a considerable distance beyond. The grade in the crossing area is 0.26 percent descending westward.

From the north on the CNW main track there are, successively, a long tangent, a 1000' curve to the left 2,124 feet, and a tangent 4,413 feet to the railroad crossing and a considerable distance beyond. In this area the grade is practically level.

Maximum Authorized Speeds

The maximum authorized speed for MILW freight trains through the Elberon interlocking is 60 miles per hour

The maximum authorized speed for all CNW trains through the interlocking is 20 miles per hour.

Circumstances Prior to Accident

MILW Train Extra 1006 West

Extra 1006 West, a westbound freight train, left Atkins Yard at 3:35 a.m. the day of the accident, and thereafter stopped at two points to pick up and set out cars. This train, consisting of 3 road-switcher type diesel-electric units, 73 cars and a caboose, left Keystone, 18.2 miles west of Atkins Yard, at 4:36 a.m. About six minutes later, it approached the Elberon interlocking and the railroad grade crossing within that interlocking. The engineer, front brakeman, and flagman were in the control compartment of the first locomotive unit. The conductor was in the caboose.

CNW Train Extra 406 East

Extra 406 East, a southbound freight train consisting of 3 road-switcher type diesel-electric units, 20 cars and a caboose, left Mason City at 1:17 a.m. the day of the accident after its brakes had been tested and had been found to be functioning properly. Approximately 3 hours 26 minutes later the train approached the Elberon interlocking without having stopped en route. The engineer and brakeman were in the control compartment at the rear of the first locomotive unit. The conductor was in the caboose.

The Accident

MILW Train Extra 1006 West

Extra 1006 West approached the Elberon interlocking at 58 to 60 m.p.h., as indicated by the speed-recording tape. All the crew members on the locomotive stated that signal 264 3 was displaying an Approach aspect when it came into view, and that soon thereafter they saw the aspect displayed by that signal change to Clear. They further stated they called these signal aspects to each other, as required by a MILW operating rule.

The train passed signal 264 3 and increased speed to about 61 m.p.h. as it approached signal 1 and the railroad crossing. According to the crew members on the locomotive, signal 1 came into view at a distance of one-half to three-fourths mile and they saw that it was displaying a Clear aspect. They said this aspect was called to each other, as required. A few seconds later, the crew members on the locomotive saw the beam of the headlight of the southbound CNW train involved, as that train approached CNW signal 2 and the

railroad crossing. Soon afterward, they saw the headlight of the CNW train come into view. At this time, they felt no concern about the CNW train, expecting it to stop short of CNW signal 2. However, as the MILW train was about to enter the crossing after passing signal 1, the engineer, front brakeman, and flagman saw that the CNW train was passing CNW signal 2 without stopping, and that it was approaching the crossing at a speed which the front brakeman and flagman estimated to be between 20 and 30 miles per hour. Both of these crew members immediately realized the CNW train could not stop short of the crossing and called a warning to their engineer, who promptly applied the brakes of the MILW train in emergency. He and the flagman then observed sparks flying under the CNW train, indicating that the brakes of the CNW train had been applied nearing the crossing. Immediately afterward, as the MILW train was moving over the crossing at 61 m p h, as indicated by the speed-recording tape, its ninth car was struck by the CNW train.

CNW Train Extra 406 East

The brakeman, the only surviving crew member on the locomotive of Extra 406 East, stated that the CNW approach signal for the Elberon interlocking displayed an Approach aspect as his train approached it, and that he could not remember whether he and the engineer called this aspect to each other as required by a CNW operating rule. He estimated that his train was moving about 35 m p h when it passed the approach signal, and said the engineer made a service brake application at that time. He could not remember if or when the service brake application was released. Soon after passing the approach signal and moving on a 1°00' curve to the left, the train entered the long tangent extending southward to and beyond CNW signal 2 and the railroad crossing. Due to the angle of the CNW and MILW tracks in the Elberon area, and because of his position on the right, or west, side of the control compartment behind the long engine hood of the first locomotive unit, the engineer's view of the MILW main track east of the railroad crossing was obstructed while nearing CNW signal 2 and the crossing.

Extra 406 East entered the approach clearing circuit of CNW signal 2 at a point 2,997 feet north of that signal. The brakeman said he observed that signal 2 was displaying a Clear aspect, but could not remember whether he and the engineer called this aspect to each other as required. According to the brakeman, the train had reduced speed to between approximately 20 and 25 m p h when it reached a rail-highway grade crossing located 482 feet north of signal 2 and 784 feet north of the railroad crossing. About that time, the brakeman saw MILW train Extra 1006 West rapidly nearing the railroad crossing from the east and recognized the danger of a collision. He called a warning to his engineer, who applied the brakes of Extra 406 East in emergency. Soon thereafter, upon realizing that his train could not stop short of a collision with the MILW train at the crossing, the brakeman alighted from the locomotive after warning the engineer to leave also. He said the train had reduced speed to about

15 m p h when he alighted from the locomotive, and the engineer was standing in the control compartment at that time. He further said that CNW signal 2 was still displaying a Clear aspect when he last observed it

Shortly after its brakes were applied in emergency, Extra 406 East passed CNW signal 2. A few seconds later, while moving at an estimated speed of 10 to 15 m p h, it struck the ninth car of the MILW train at the railroad crossing.

The conductor of Extra 406 East was unaware of anything being wrong before the brakes of his train were applied in emergency shortly before the collision. He estimated the train speed to be about 25 m p h at that time, and said that a service application of the train brakes had been made before the emergency brake application. He further said the train had been required by train orders to reduce speed at several points while en route to the collision point and the speed was reduced at each point as required, indicating that the train brakes were functioning effectively.

After the accident, the brakeman of the CNW train and the conductor of the MILW train were hospitalized in the same room. According to the MILW conductor, he and the CNW brakeman discussed the accident the day after it occurred. The following is in essence what the CNW brakeman said about the accident, as reported by the MILW conductor:

After leaving Mason City, CNW train Extra 406 East reduced speed on occasions as required by train orders, and the train brakes functioned properly. As the train approached the Elberon railroad crossing, CNW signal 2 was seen to be displaying a Stop aspect and the engineer initiated a service application of the brakes. This application was ineffective and the engineer attempted one or two more brake applications, which were also ineffective. The engineer then applied the brakes in emergency. The brakeman saw the MILW train approaching the crossing and alighted from the locomotive after warning the engineer to alight also.

The CNW brakeman said during the investigation that he could not recall discussing the accident with the MILW conductor.

Casualties

The engineer of the CNW train was killed. The brakeman of that train was injured, sustaining rib fractures and multiple contusions and abrasions when he fell after alighting from the locomotive.

The MILW conductor, who was sitting at the caboose desk when the collision occurred, was also injured. The impact threw him against the door at the front of the caboose, causing him to sustain a hip bruise, strained back, and severe bruises about his body.

Damages

MILW Train Extra 1006 West

The train stopped with the front end 3,350 feet west of the railroad crossing. The 8th to 38th cars, inc, were derailed. They stopped in various positions on or near the MILW main-track structure, east and west of the crossing. Of the derailed cars, twenty-three were destroyed, six heavily damaged and two slightly damaged.

CNW Train Extra 406 East

This train stopped with the second car on the crossing. All three locomotive units and the first three cars were derailed. They stopped on or near the CNW main track structure in the crossing area. The three locomotive units were destroyed. The first two cars were heavily damaged, and the third car was slightly damaged.

Elberon Interlocking Signal Equipment

The structure housing the relays associated with the signal circuits of the interlocking was destroyed in the accident, and an underground signal cable in the housing area was severed.

The total cost of damages to both trains, track structures, and signal equipment is estimated as exceeding \$500,000.

Post-Accident Examinations and Tests

CNW Train Extra 406 East

Examination disclosed that the wheels of the locomotive units showed evidence of a heavy brake application having been made. All three locomotive units were so badly damaged that it was virtually impossible to determine the position of the locomotive controls at the time of the accident. The brakes of the undamaged cars were tested and were found to be functioning effectively.

Elberon Interlocking Signal Equipment

The CNW maintains the interlocking. An Inspector of the Federal Railroad Administration inspected the interlocking on September 7, 1967, and no exceptions to the operation of the interlocking signals were taken. CNW records and reports, including a report made in March 1968, revealed that no defective condition of the interlocking had been found during the course of frequent inspections made prior to the accident.

Because of the damage to the signal relay housing and the equipment therein, the relays could not be tested after the accident

The lighting circuits of the interlocking home signals and the MILW approach signal (264 3) were tested by energizing the circuits with a portable battery, and the operating mechanisms of these signals were also tested. The tests revealed no defective condition.

Speed Recording Device of MILW Train

This device was calibrated after the accident and was found to be accurately recording the speed on the tape

Train Crews Hours of Service

MILW Train Extra 1006 West

At the time of the accident, the crew members of this train had been continuously on duty 3 hours 25 minutes, after having been off duty 8 hours

CNW Train Extra 406 East

All the crew members of this train had been continuously on duty 3 hours 45 minutes at the time of the accident, after having been off duty in excess of 10 hours

Computations Relating to Entrance of Trains to Interlocking

Best information available indicates that the collision occurred at 4:45 a m

The MILW train approached the interlocking and proceeded to the railroad crossing at an average speed of about 60 miles per hour (88 feet per second). The distance between the crossing and the point where a westbound MILW train enters the approach clearing circuits for signals 264 3 and 1 is 14,090 feet. A train moving at 60 m.p.h. would consume 160 seconds to traverse that distance. Thus, it appears that MILW train Extra 1006 West entered the aforesaid approach clearing circuit about 4:42:20 a m

Information developed in the investigation indicates that the CNW train was moving about 35 m p h when it passed the approach signal for signal 2 and was moving between 20 and 30 m p h when it reached the highway crossing located 784 feet north of the railroad crossing. A southbound CNW train moving at an average speed of 25 m.p.h. (36 7 feet per second) would consume 69 seconds to traverse the distance (2,515 feet) between the highway crossing and the point where it entered the approach clearing circuit of signal 2. Moving at an average speed of 15 m p h (22 feet per second), it would consume 36 seconds to traverse the distance between the highway and railroad crossings. From the time it entered the approach clearing circuit until the time it reached the

crossing, a train moving at the aforesaid speeds for the distances shown would have consumed a total of 105 seconds. Thus, based on average speeds consistent with the best available information relating to the approach of the CNW train to the collision point, it appears this train entered the approach clearing circuit for signal 2 about 4:43:15 a.m. This is 55 seconds after the computed time that the MILW train entered the approach clearing circuit for signals 264 3 and 1.

Enginemen of MILW and CNW Trains

MILW Train Extra 1006 West

The engineer of this train was 39 years old at the time of the accident. He began railroad service as a fireman in June 1945 and was promoted to locomotive engineer in December 1955. He was last examined in operating rules in 1967, and passed the examination. His record is free of rule infractions or disciplinary action. It shows, however, that he was taken out of service on November 1, 1967, because of a heart condition. He resumed service on December 15, 1967, with no restriction except a requirement to be re-examined by a physician in six months.

CNW Train Extra 406 East

The engineer of this train was 54 years old at the time of the accident. He began service as a fireman in August 1941, and was promoted to locomotive engineer in October 1946. He was last examined in operating rules in 1967, and passed the examination. His record for the ten-year period preceding the accident is free of rule infractions or disciplinary action. It shows, however, that he suffered from dermatitis since early 1962, and this condition caused him to take several two to three months leaves-of-absence, the last being between August 1 and October 1, 1967. He also took a leave-of-absence for two months in 1965 to recover from a hernia operation.

The brakeman of CNW train Extra 406 East stated that he had worked frequently with the engineer over a two-year period, and that the engineer appeared to be in normal condition on the day of the accident.

Analysis of Accident

The preponderance of evidence developed in the investigation strongly indicates that the MILW train entered the approach clearing circuit for signals 264 3 and 1 shortly before the CNW train entered the approach clearing circuit for signal 2. Consequently, in the light of this evidence and the arrangement of the signal circuits of the Elberon interlocking it is concluded that, at the time of the accident, the MILW train was moving through the interlocking and over the crossing in accordance with Clear-signal indications.

It is further concluded that signal 2 was displaying a Stop aspect for the CNW train and that the CNW train passed signal 2 without stopping, causing the accident.

Statements the CNW brakeman reportedly made to the MILW train conductor after the accident tend to support the conclusion that signal 2 displayed a Stop aspect for the CNW train

The reason why the CNW engineer failed to stop his train short of signal 2 could not be determined. Assuming that he saw the Stop aspect displayed by signal 2, there is a possibility that he failed to stop as required due to (a) making an insufficient service application of the brakes in approach to signal 2 (b) or not making a service brake application soon enough to stop short of that signal. In any event, the CNW train apparently was moving about 35 m p h as it passed the CNW approach signal and had reduced speed to between 20 and 30 m p h when it reached the highway crossing located 482 feet north of signal 2. About the latter time, the engineer applied the brakes in emergency. However, due to its speed at that time there was insufficient braking distance for the train to stop short of signal 2 or the railroad crossing, resulting in the collision.

Findings

1 At the time of the accident, the MILW train was moving over the railroad crossing in accordance with Clear-signal indications, and with applicable rules and regulations except that it was moving slightly faster than its maximum authorized speed. The slight overspeed, however, was not a significant factor in the accident.

2 CNW signal 2 displayed a Stop aspect as the CNW train approached it.

3 The CNW train passed signal 2 without stopping, as required, resulting in this train striking the MILW train at the railroad crossing.

4 The reason why the CNW train failed to stop short of signal 2 could not be determined.

Cause

The accident was caused by failure of the engineer to stop the CNW train in accordance with an interlocking Stop-signal indication, resulting in the CNW train colliding with the MILW train moving over the railroad grade crossing.*

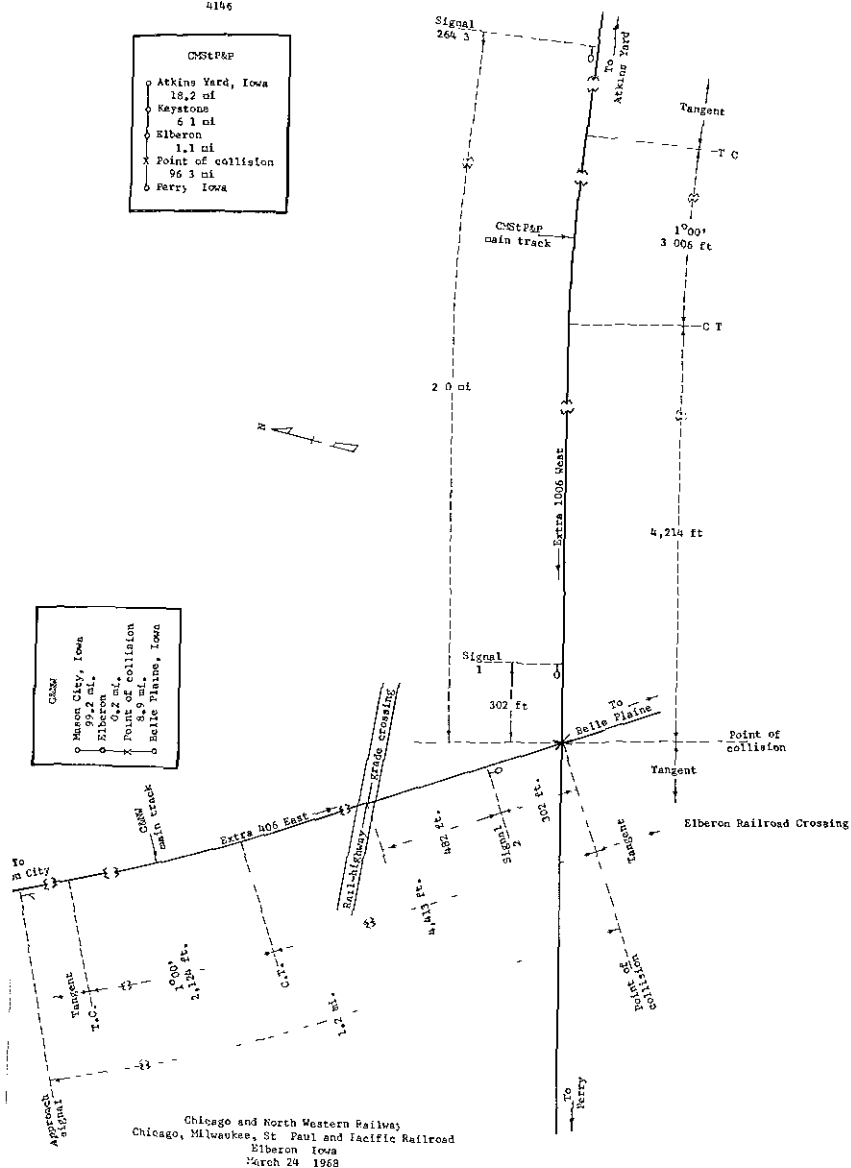
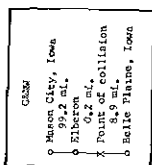
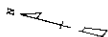
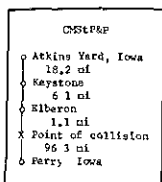
Dated at Washington, D. C., this 10th day of June 1969

By the Federal Railroad Administration

Mac E. Rogers, Chairman
Railroad Safety Board

*The Federal Railroad Administration has no jurisdiction over railroad operating rules; track structures; bridges; railroad highway grade crossing protection; track clearances; consist

of train crew; qualifications or physical condition of railroad employees, running and draft gear on cars, or the construction of cars except those appurtenances within jurisdiction of the Safety Appliance Acts and the Power Brake Law of 1958



Chicago and North Western Railway
Chicago, Milwaukee, St. Paul and Pacific Railroad
Elberon, Iowa
March 24, 1968