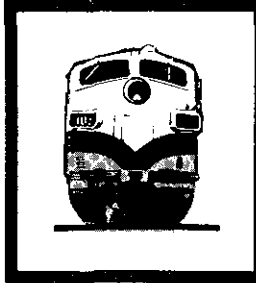


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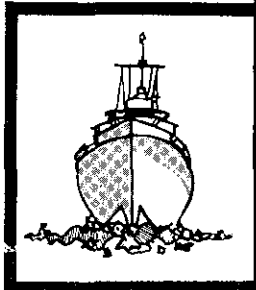
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# NATIONAL TRANSPORTATION SAFETY BOARD

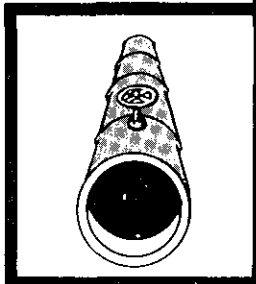


WASHINGTON, D.C. 20594



## ✓ RAILROAD ACCIDENT REPORT

14



HEAD-ON COLLISION OF  
BURLINGTON NORTHERN RAILROAD  
FREIGHT TRAINS EXTRA 6760 WEST AND  
EXTRA 7907 EAST  
NEAR MOTLEY, MINNESOTA  
JUNE 14, 1984

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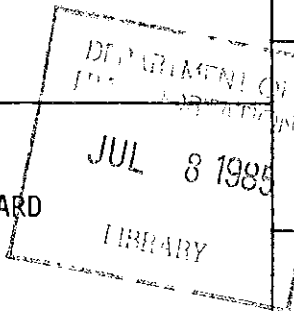


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16. Abstract <p>About 1:00 a.m., on Thursday, June 14, 1984, Burlington Northern Railroad Company freight trains Extra 6760 West and Extra 7907 East collided head-on on the single track main line near Motley, Minnesota. The trains were being operated on dispatcher-issued train orders, in nonsignallized territory. The westbound train had been traveling about 35 to 40 mph and the eastbound train about 45 to 49 mph just before the emergency applications of the automatic air brakes of both trains. The accident resulted in three fatalities, one serious injury, and three minor injuries; damages were estimated at \$3,931,146. The dispatcher controlling the movement of the trains had been promoted to dispatcher recently before the accident and was working in his second tour of duty in that position. The dispatcher had been promoted from a stenographic/clerical position after having been nominated to and completing a company training program; he had no prior operating experience.</p> <p>The National Transportation Safety Board determines that the probable cause of this accident was the Burlington Northern Railroad's inadequate personnel selection criteria which resulted in the placement of an individual without sufficient training and supervision into the safety critical position of train dispatcher.</p>					
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NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

Adopted: April 30, 1985

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HEAD-ON COLLISION OF  
BURLINGTON NORTHERN RAILROAD FREIGHT TRAINS  
EXTRA 6760 WEST AND EXTRA 7907 EAST  
NEAR MOTLEY, MINNESOTA  
JUNE 14, 1984

SYNOPSIS

About 1:00 a.m., on Thursday, June 14, 1984, Burlington Northern Railroad Company freight trains Extra 6760 West and Extra 7907 East collided head-on on the single track main line near Motley, Minnesota. The trains were being operated on dispatcher-issued train orders, in nonsignallized territory. The westbound train had been traveling about 35 to 40 mph and the eastbound train about 45 to 49 mph just before the emergency applications of the automatic air brakes of both trains. The accident resulted in three fatalities, one serious injury, and three minor injuries; damages were estimated at \$3,931,146. The dispatcher controlling the movement of the trains had been promoted to dispatcher recently before the accident and was working in his second tour of duty in that position. The dispatcher had been promoted from a stenographic/clerical position after having been nominated to and completing a company training program; he had no prior operating experience.

The National Transportation Safety Board determines that the probable cause of this accident was the Burlington Northern Railroad's inadequate personnel selection criteria which resulted in the placement of an individual without sufficient training and supervision into the safety critical position of train dispatcher.

INVESTIGATION

Events Preceding the Accident

About 3:45 p.m., 1/ on Wednesday, June 13, 1984, a traincrew consisting of an engineer, conductor, and two brakemen went on duty at Superior, Wisconsin, and departed about 5:10 p.m., on Burlington Northern (BN) train Extra 6774 West en route to Staples, Minnesota. After arriving about 10:50 p.m. at Staples, the crew signed in on the train register and were informed that they would not be going off duty at that time, but would be taking train Extra 7907 East back to Superior. The engineer and two brakemen then went to a restaurant to eat a meal before the return trip, while the conductor remained at the depot to complete his paperwork.

1/ All times herein are central daylight time.

About 11:41 p.m. the dispatcher, located at Northtown Yard in Minneapolis, issued Train Order No. 85 (see appendix C), establishing authority for train Extra 7907 East from Staples to Carlton. (See figures 1 and 2.) (The route from Carlton to Superior is on a different subdivision and under the jurisdiction of another dispatcher.) Train Order No. 85 authorized train Extra 7907 East to proceed after train Extra 6730 West had arrived at Staples; however, train Extra 6730 West had already arrived at Staples at 11:35 p.m. The Train Order Crew Board (TOCB) clerk at Staples advised the dispatcher of the train's arrival, but the dispatcher did not cancel Train Order 85 and issue a new order. Rather, he issued Train Order No. 86 as an advisory that train Extra 6730 West had arrived. The dispatcher issued the clearance allowing train Extra 7907 East to proceed about 11:50 p.m. Shortly after the train order and clearance were received at Staples, the engineer and brakemen returned from the restaurant, met with the conductor, read the train orders and clearance, and were transported by a van to train Extra 7907 East.

About 12:05 a.m., June 14, 1984, train Extra 2560 West, a local freight train, arrived in Staples from Carlton, over the single track main line between those two locations. According to the conductor of train Extra 7907 East, "I was aware that the local had come in the yard going by our caboose, but I didn't go out and look at it because I was busy at the desk and getting ready to depart." The conductor further stated ". . . I knew he was out of Superior and I knew he was on the line out of Superior, but I had no idea that he had been in the yard or what time he got into the yard. . . ." No mention of Train Extra 2560 West was made in Train Order No. 85. Train Extra 7907 East departed Staples about 12:25 a.m., on June 14, 1984, en route east to Superior, with the conductor and rear brakeman in the caboose and the engineer and head brakeman in the locomotive.

The traincrew of train Extra 6760 West had reported for duty at Superior about 8:00 p.m., on June 13, 1984. The traincrew consisted of an engineer, a conductor, and two brakemen. Train Order No. 79 established the authority for train Extra 6760 West to proceed from Carlton to Staples, and advised the crew that train Extra 2560 West was ahead of them. (See appendix D.) Train Order No. 79 was issued at 9:29 p.m., on June 13, 1984. The clearance allowing train Extra 6760 West to proceed was issued at 9:30 p.m. The train passed McGregor about 11:20 p.m., at which time the McGregor operator so notified the dispatcher. The crew of train Extra 6760 West called the operator at Brainerd a little after midnight to inquire as to the location of train Extra 2560 West, the local freight train. The operator advised them that the local had left Brainerd about 11:20 p.m. Meanwhile, the TOCB clerk at Staples contacted the dispatcher about 12:13 a.m., inquiring as to whether there was a westbound train due to arrive at Staples, because she had heard ". . . another train calling Brainerd. . . ." The dispatcher advised the TOCB clerk at Staples that train Extra 6760 West had gone by McGregor about 11:20 p.m., and further advised her of the name of the engineer and conductor, the train consist details, and the estimated time of arrival of 2:00 a.m. at Staples. At 12:38 a.m., the operator at Brainerd informed the dispatcher that train Extra 6760 West had gone by Brainerd about 12:32 a.m. At 12:39 a.m., the TOCB clerk at Staples informed the dispatcher that train Extra 7907 East had departed Staples at 12:25 a.m., and that train Extra 2560 West, the local freight train, had arrived at Staples at 12:05 a.m. The dispatcher acknowledged the transmission.

### The Accident

According to the conductor of train Extra 7907 East, the engineer slowed the train when it departed Staples through the yard and crossovers located there. After the rear of the train passed the crossovers, the conductor radioed the engineer to notify him to

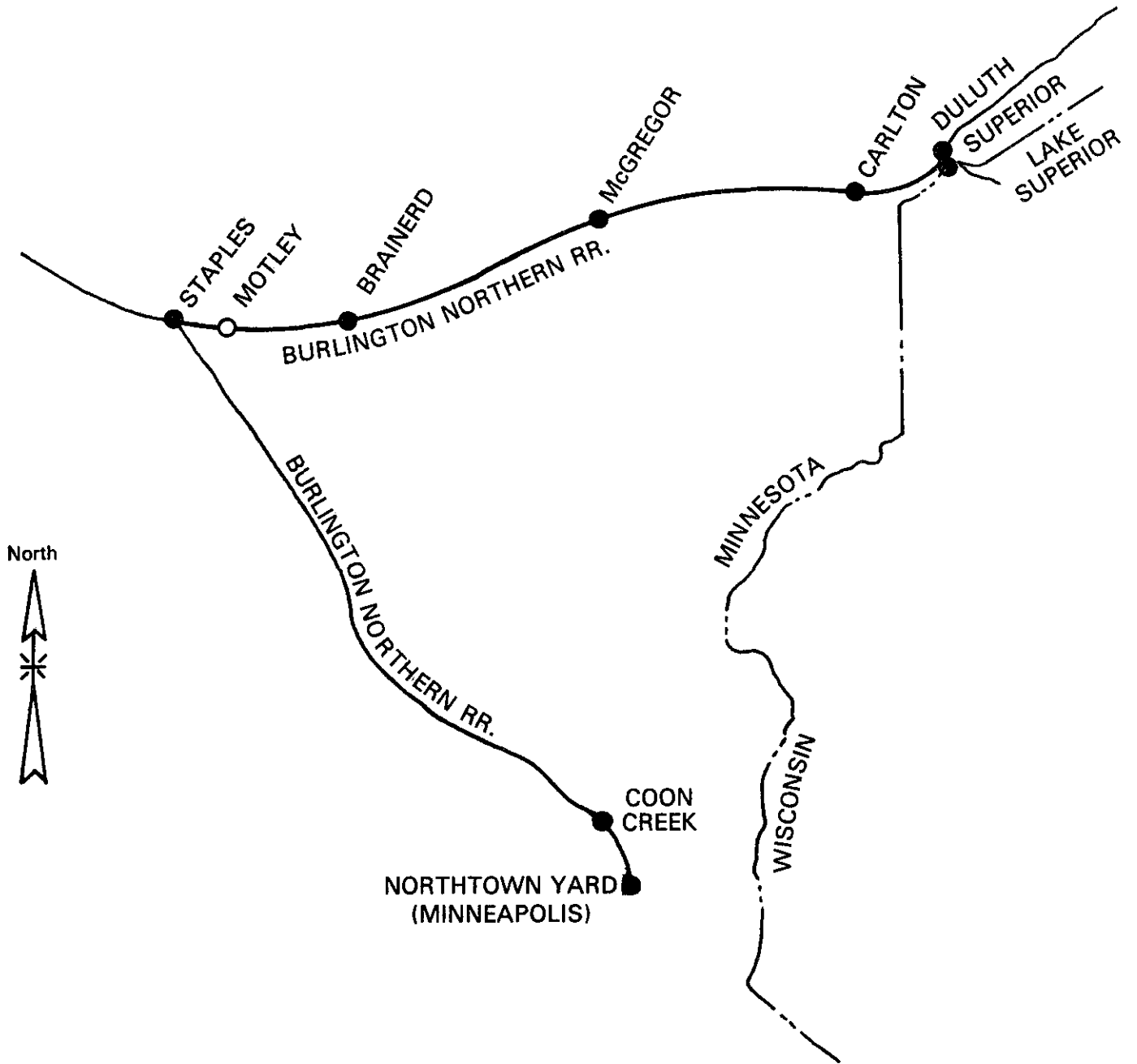


Figure 1.—Location diagram.

	Westbound Trains		Eastbound Trains	
Station	Extra 6730 West	Extra 2560 West	Extra 6760 West	Extra 7907 East
Carlton	8:30 p.m. 6/13/84	8:55 p.m. 6/13/84	10:22 p.m. 6/13/84	N/A
McGregor	9:30 p.m. 6/13/84	9:48 p.m. 6/13/84	11:20 p.m. 6/13/84	N/A
Brainerd	10:45 p.m. 6/13/84	arr. 11:10 p.m. dep. 11:20 p.m. 6/13/84	12:32 a.m. 6/14/84	N/A
Staples	11:35 p.m. 6/13/84	12:05 a.m. 6/14/84	N/A	12:25 a.m. 6/14/84

Figure 2.—Times of trains by stations.

attain track speed. The conductor stated that the engineer responded and that he thought the train accelerated to about 35 mph. (The maximum allowable speed at this location for a loaded coal train is 40 mph.) Approaching the accident site in an easterly direction, the track is tangent (straight) and level for more than 1 mile.

When train Extra 6760 West passed through Brainerd, the engineer slowed the train for a 10-mph speed restriction through that vicinity. After having passed Brainerd, the engineer accelerated the train to about 49 mph. (The maximum speed at this location for an empty coal train is 49 mph.) As the locomotive of train Extra 6760 West proceeded through a 1° curve to the right and neared tangent track, the head brakeman noticed light reflecting on the rails ahead of his train. He further stated that he then "... could see another engine that we didn't have (train) orders on, and I didn't know if that engine was in a siding for awhile. It took me awhile to remember the track and realize that there was no siding in that area." The head brakeman stated that he and the engineer applied the emergency brakes at the same time and that he then stepped out onto the front platform of his locomotive unit. He further stated "... I could see it (the oncoming locomotive) was moving, I was reading engine numbers and I decided I better get off, and I jumped." The head brakeman was not able to ascertain whether the engineer also had jumped before the trains collided head on, about 1:00 a.m., near Motley, Minnesota. (See figure 3.)

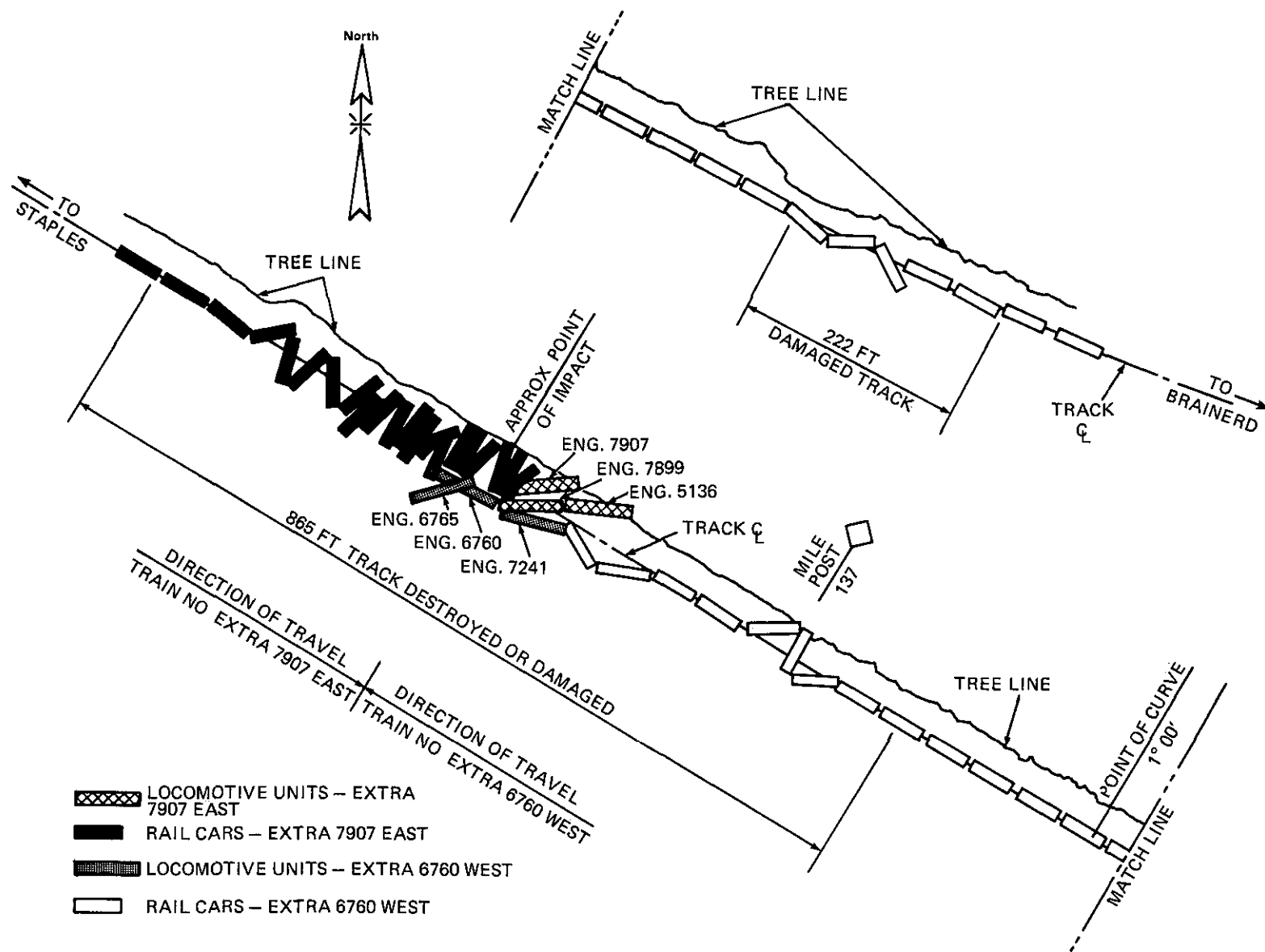


Figure 3.--Plan view of accident site.



The rear-end crew of train Extra 7907 East stated that they were able to see the headlight of train Extra 6760 West just before the collision and that the automatic air brake of their train was in emergency application before the collision. They further stated that their caboose came to "...a normal type stop..." after the collision. The rear-end crew of train Extra 6760 West stated that their first indication of anything unusual was an emergency application of the automatic air brakes, followed by the sound of an explosion and an abrupt stop of the caboose. They further stated that after they stopped, they saw flames rising above the tops of the trees to the north side of the track. Immediately after the cabooses of both trains came to a stop, both conductors contacted the TOCB clerk at Staples to summon emergency response personnel to the accident site, and to arrange for protection for the rear ends of both trains. The rear-end crewmembers of both trains then proceeded to the collision point, where they found the injured head brakeman from train Extra 6760 West. All of the locomotive units from both trains derailed, as did 16 empty hopper cars from train Extra 6760 West and 19 loaded coal hopper cars from train Extra 7907 East. The locomotive fuel tanks were breached during the collision, and the spilled fuel was ignited. The locomotive units of both trains carried an estimated total of about 5,000 gallons of fuel at the time of the accident. The engineer of train Extra 6760 West and the engineer and head brakeman of train Extra 7907 East were killed in the accident.

The Motley, Minnesota, Volunteer Fire Department (VFD) was notified of the accident by telephone from the BN's depot at Staples about 1:03 a.m., on June 14, 1984. The assistant fire chief stated that, while approaching the accident site, he could see fire from about 4 miles away. The VFD arrived on site about 1:15 a.m., but could get their equipment only to about 400 feet from the fire because train Extra 7907 East was occupying an at-grade dirt road crossing leading to an access road which paralleled the south side of the track. BN brought a locomotive unit from Staples, which was used to pull the remainder of train Extra 7907 East clear of the at-grade crossing, allowing improved access to the emergency responders. Fire and rescue units from four local jurisdictions responded, with a total of about 56 personnel and 15 pieces of equipment. The fire was declared under control about 4:00 a.m., and the last unit departed the scene at 10:45 p.m., on June 14, 1984. Police emergency response, primarily to assist in rescue efforts and crowd control, consisted of about 12 officers from the State Patrol, the County Sheriff's Department, an adjacent county, and two other local jurisdictions.

At the time of the accident, the temperature was about 59° F, visibility was good, and there was no precipitation. Although ground fog was sporadic in the general vicinity, none was noted near the accident site.

### Injuries to Persons

<u>Injuries</u>	<u>Head End Crew Extra 6760 West</u>	<u>Rear End Crew Extra 6760 West</u>	<u>Head End Crew Extra 7907 East</u>	<u>Rear End Crew Extra 7907 East</u>	<u>Total</u>
Fatal	1	0	2	0	3
Serious	1	0	0	0	1
Minor	0	2	0	1	3
None	0	0	0	1	1
Total	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>8</u>

### Train Information and Damage

The locomotive of train Extra 7907 East consisted of 3 diesel-electric units; BN 7907, BN 5136, and BN 7899. The first and third units were model SD-40-2, 3,000-horsepower, 6-axle units manufactured by the Electromotive Division of General Motors Corporation. The second unit was a model C 30-7, 3,000-horsepower, 6-axle unit manufactured by the General Electric Company. The locomotive weighed about 1,156,000 pounds. All the units were equipped with radios, 26-L airbrake systems, dynamic brakes, speed indicators, and recorders. The caboose was equipped with an operable radio. At the time of the accident, the train contained 110 loaded cars of coal for trailing tonnage of 14,415 tons and a total length of 6,081 feet.

The locomotive of train Extra 6760 West consisted of 3 diesel-electric units; BN 6760, BN 6765, and BN 7241. The three units were also all model SD-40-2. The locomotive weighed about 1,104,000 pounds. All the units were equipped with radios, 26-L airbrake systems, dynamic brakes, speed indicators, and recorders. The caboose was equipped with an operable radio. At the time of the accident, the train contained 110 empty hopper cars, had a trailing tonnage of 3,403 tons, and was a total length of about 6,090 feet.

The three locomotive units in each of the trains were destroyed. (See figure 4.) The operating compartments of the lead locomotive unit of each train were crushed, and the units were sheared off at platform level. Of the 19 cars derailed in train Extra 7907 East, 10 were destroyed, 7 were moderately damaged, and 2 were lightly damaged. Of the 16 cars derailed in train Extra 6760 West, 8 were destroyed, 5 were moderately damaged, and 3 were lightly damaged. (See figures 5 and 6.) About 1,087 feet of main track was destroyed or damaged in the accident.

Damage was estimated to be as follows:

Equipment (locomotives)	\$3,250,859
Equipment (cars)	521,050
Track	65,237
Lading	54,000
Wreckage Clearance	40,000
	<u>\$3,931,146</u>

### Personnel Information

Traincrews.--The engineers, conductors, and brakemen on trains Extra 7907 East and Extra 6760 West were qualified by the BN for their respective positions, and all were current on BN operating rules. (See appendix B.)

Other--The TOCB clerk at Staples and the operator at Brainerd were qualified by the BN for their respective positions and were current on BN operating rules. (See appendix B.)

The Dispatcher.--The dispatcher controlling train movements between Staples and Carlton had been employed by the BN for about 12 years. He had held positions of relief clerk, messenger order service clerk, stock clerk, maintenance-of-way clerk, and word processing clerk. About 3 months before the accident, he had been nominated for and

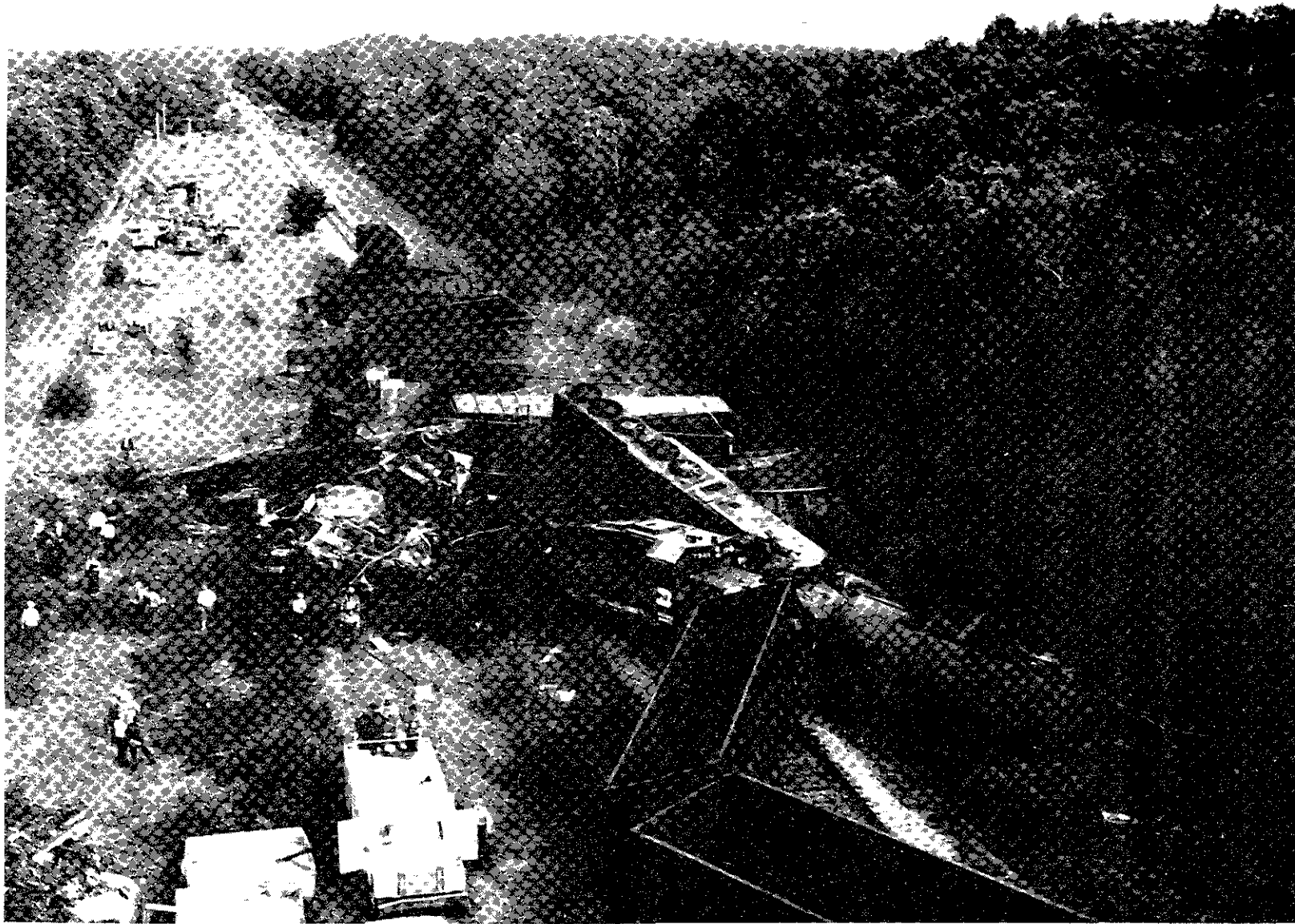


Figure 4.--View of accident site.

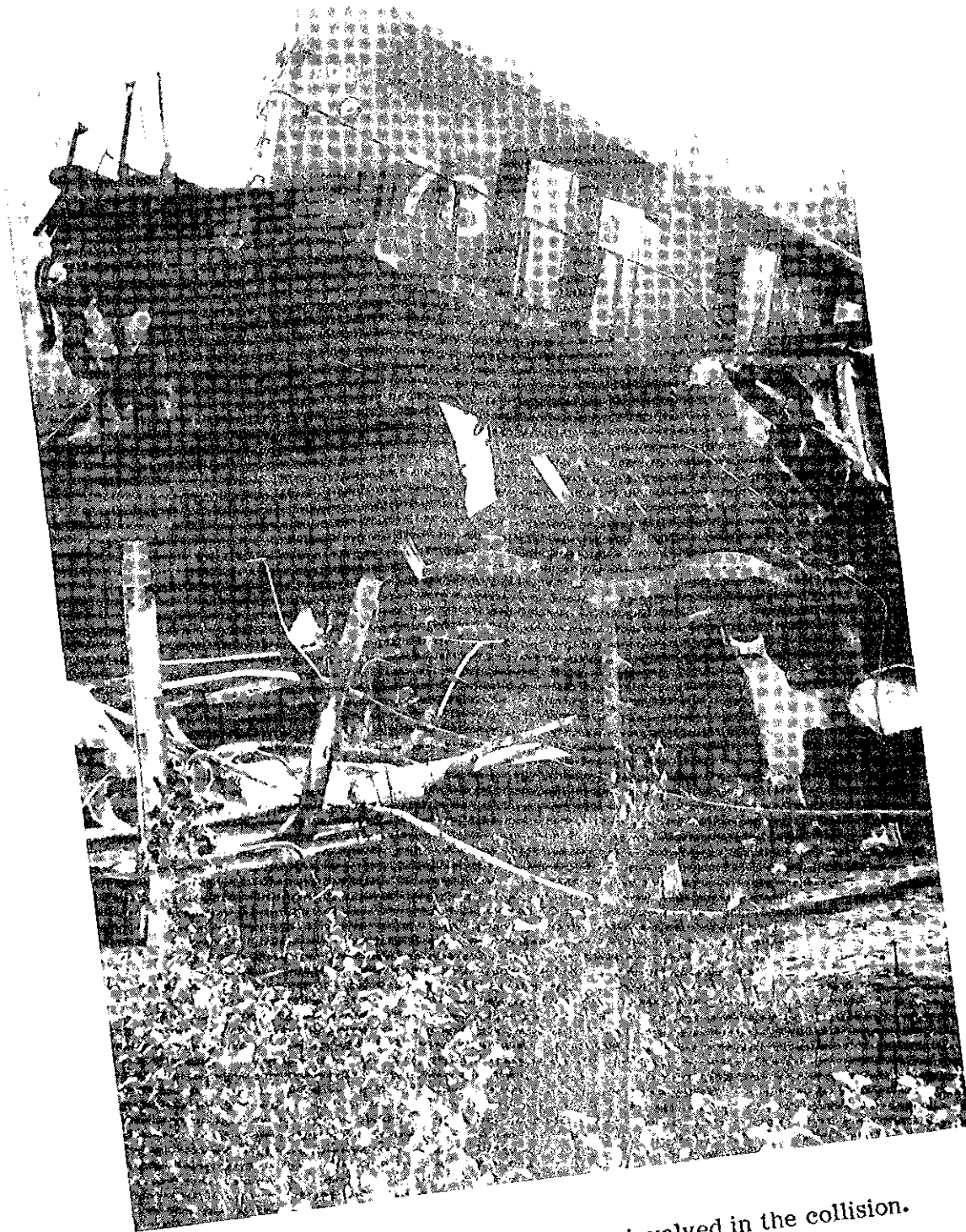


Figure 5.--View of locomotive units involved in the collision.

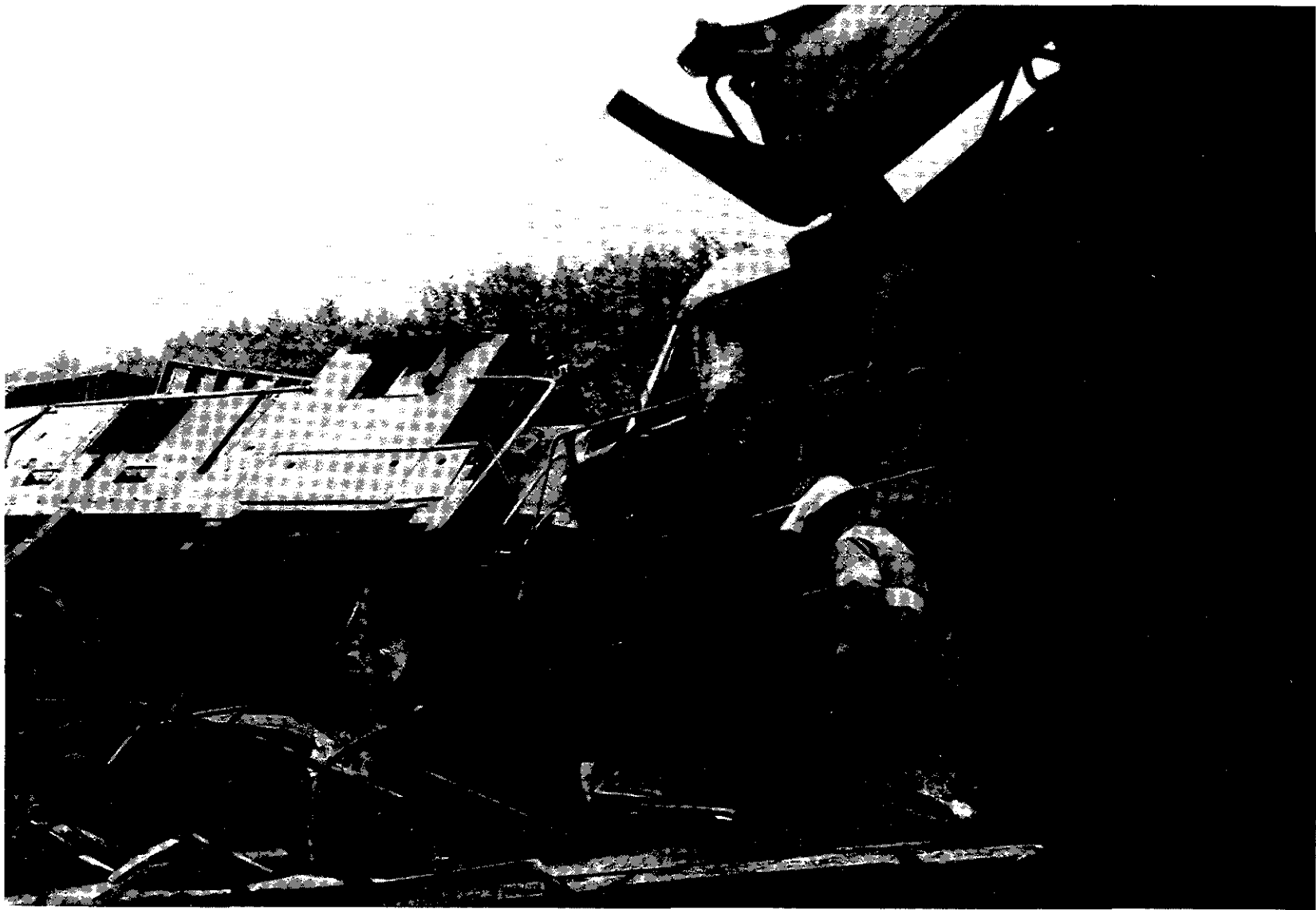


Figure 6.--View of locomotive units involved in the collision.

entered into a dispatcher training program, which was part of an advancement program entitled "This Way Up," (TWU) including a 2-week formal classroom session administered by the BN. He worked as a qualified dispatcher for the first time 7 days before the accident, and on the day of the accident, he was working as a qualified dispatcher only for the second time. Before his dispatcher training, he had not worked in operations. (See appendix B.)

In order to enter the advancement program, an applicant had to fill out several forms and pass an interview by the personnel department. Since the BN recently had consolidated dispatching functions to the Minneapolis area and several current dispatchers had declined relocation to Minneapolis, the BN addressed its pressing need for additional dispatchers by training new dispatchers for those positions in this program. The BN regional personnel director told Safety Board investigators that she had become acquainted with the dispatcher while he was working in a clerical position because their offices were close. When she saw his TWU application for advancement, she nominated him to the dispatcher training school. She further stated that to her knowledge BN had not established screening or aptitude criteria for selection of potential candidates for dispatcher training, and that her basis for selecting an individual for such training was her 23 years of experience with BN and the fact that she had once worked as a stenographer in a dispatcher's office. The BN's regional superintendent of rules, present at the Safety Board's interview with the regional personnel director, voiced no disagreement with her statement.

In a deposition proceeding conducted by the Safety Board on August 21-22, 1984, the involved dispatcher declined to testify on the advice of his attorney. During that proceeding, the regional chief dispatcher was asked if he had received any information about the new dispatchers assigned to him. He responded:

Not really. They're screened by the Personnel Department before I get them, and I'm assuming that they've checked out anything that could be detrimental before they are a student dispatcher.

The BN subsequently submitted an affidavit to the Safety Board, dated March 5, 1985, in which the regional chief dispatcher stated:

I wish to clarify and explain that answer.

Candidates for the dispatcher training class of March, 1984, which included (the dispatcher) were selected in the following manner. Interested individuals were required to complete application forms. Approximately 25 candidates were screened by (the regional personnel director) or other employees of the Employee Relations Department for the Twin Cities Region and then considered by myself and ( ), Manager, Train Operations, Twin Cities Region.

Specifically, on Saturday, March 3, 1984, (Manager, train operations) and I reviewed the applications and recommendations submitted for each individual. We considered train order experience, railroad operations experience, work background and education, and then based upon our judgment and experience, selected ten candidates. Additional candidates were subsequently added by (manager, train operations) to bring our class number to 12 trainees.

The involved dispatcher was among the first 10 candidates selected. As a part of the training program, on March 12, 1984, dispatcher trainees began observing qualified dispatchers at work to familiarize themselves with dispatcher functions. The class consisted of 12 trainees, 11 of which had various operations-related experience with BN. On March 19, 1984, the trainees began a 10-workday classroom course of dispatcher training, administered by the BN's regional superintendent of rules. The training course consisted of reviews of the Consolidated Code of Operating Rules and the Rules and Instructions for Train Dispatchers, of which segments were assigned as homework on a daily basis. The daily classes consisted of reviewing the lesson plan exercises and audio and visual aids, practicing issuance of train orders, and problem-solving applications. Simulation of dispatcher functions was performed during part of the last scheduled day. (See appendix E.) The training course was completed on March 30, 1984, at which time the candidates began on-the-job (OJT) training of an indefinite length.

During the OJT period, the candidates observed qualified dispatchers on a one-to-one basis and issued train orders under the direct supervision of those qualified dispatchers. The OJT period continued for 16 work-days, during which time two candidates elected to drop out of the program. On April 24 and 25, 1984, the remaining 10 candidates were given an examination. The 500-question examination contained a 55-question section on train orders worth 254 points, and a 445-question section on operating rules worth 639 points. The test was structured in the same sequence and format as the appropriate books of rules. Failure was automatic for a score of less than 90 percent (minus 88 points), regardless of the distribution of the errors between the two sections of the examination. That is, a person conceivably could get all of the questions correct on operating rules, have a minus 88 points on train orders, and still receive a passing grade.

Six of the candidates passed the examination, while 4 candidates, including the dispatcher at the time of the accident, did not. His overall grade was 84 percent (minus 139 points). He had 40 points deducted out of the 254 points for the train order portion and 99 points deducted of the possible 639 points for the operating rules.

On April 25, 1984, the regional superintendent of rules reviewed the examinations with the candidates, and from April 26 through May 11, 1984, the involved dispatcher returned to OJT training. On May 14 and 15, 1984, the four candidates who did not pass the earlier examination were reexamined by taking the same examination that they had previously taken and failed; all four candidates passed the examination at this time. On the reexamination, the involved dispatcher's overall grade was 92 percent (minus 69 points). He had 34 points deducted for the train order portion and 35 points deducted for the operating rules portion. After passing the examination, the involved dispatcher received additional OJT from May 16 through June 5, 1984. According to the regional chief dispatcher, on June 5, the administrative chief who handles dispatchers' vacations suggested that the involved dispatcher "was able to go to work." One of the other dispatchers had requested a day's vacation and the BN needed a relief dispatcher. When the announcement was made June 5 that the involved dispatcher would be working his first shift the following day, one of the dispatchers who had been giving the involved dispatcher his OJT expressed concern that he was not ready to work yet, and should have more break-in time because "...he was slow and the trains would probably be delayed..." The regional chief dispatcher decided to put the involved dispatcher to work June 6, with the understanding that he would be monitored closely. On June 6, 1984, he worked his first regular tour of duty as a dispatcher, and the regional chief dispatcher stated that the involved dispatcher's supervisor "...spent a total of 20 minutes or so with him off and on..." on June 6, and that "...as far as he knew, (the involved

dispatcher) did an adequate job." On June 13, 1984, he worked his second regular tour of duty, reporting for work about 10:35 p.m. No provision was made to monitor closely his performance at that time. Between the two regular duty tours, he received 3 days of OJT and had a familiarization hy-rail trip in the Northtown terminal area.

### Method of Operation

Trains are operated through the Motley area by timetable, special instructions, and train orders. The single track main line is not signalized. Section 236.0(c), Applicability and Minimum Requirements, of the Federal Railroad Administration's (FRA) Rules, Standards, and Instructions Governing the Installation, Inspection, Maintenance, and Repair of Signal and Train Control Systems, Devices, and Appliances, provides that signal systems be in place, "Where a passenger train is operated at a speed of 60 or more miles per hour, or a freight train is operated at a speed of 50 or more miles per hour. . . ." The BN timetable stipulates a maximum permitted track speed between Carlton and Staples of 49 miles per hour, and 40 miles per hour for loaded coal trains.

Traincrews that operate over this territory originate at BN's Duluth/Superior terminal facility and layover as necessary at Staples. The line between Duluth/Superior and Carlton is controlled by a different dispatcher than the line between Carlton and Staples. All of the dispatchers who control train movements over this general territory are located at Minneapolis. The dispatcher controlling movement between Staples and Carlton is located in the office building at Northtown Yard at Minneapolis, adjacent to the offices of the chief and assistant chief dispatchers. Train orders and clearances for trains operating between Carlton and Staples are transmitted for westbound trains from the dispatcher to an operator at Carlton or Central Avenue who copies the orders and clearances, verifies them by reading them back to the dispatcher, and then hands them to the traincrews. In the case of eastbound trains, the dispatcher transmits the orders and clearances to an operator at Coon Creek, who also verifies them by reading them back to the dispatcher, and then telecopies the orders and clearances to the TOCB clerk at Staples. The TOCB clerk at Staples then relays copies to the traincrews. The TOCB clerk is required by the BN to check the order numbers but is not required to read and understand the content of the train orders and clearance forms. The TOCB clerk is required to be current on the Code of Consolidated Operating Rules and performs crew board call duties as necessary.

In addition to train order duties, operators and TOCB clerks also are required to perform clerical duties, such as keypunching, demurrage, waybill preparation, roll-by inspection, and time documentation of passing trains. Operators and TOCB clerks communicate with dispatchers using the dispatcher line with a headset listening attachment or a telephone. The TOCB clerk facility at Staples is housed in the terminal adjacent to the crew facilities. The operator at Brainerd is located in the yard office at that location. Both locations are staffed 24 hours a day, except Brainerd, which is closed Sunday nights from midnight to 8:00 a.m.

The following are excerpted from the BN Consolidated Code of Operating Rules in effect at the time of the accident:

#### MOVEMENT OF TRAINS

S-88. Except where Rule 261 is in effect, extra trains will be governed by train orders with respect to opposing extra trains. At meeting points between extra trains established by Form S-A train order, the train order must specify which train will take siding.



## TRAIN DISPATCHERS

990. Train dispatchers will issue train orders and must transmit and record them as prescribed by the rules. They must make the various records required and must comply with special instructions, including "Train Dispatchers Manual", where provided.

The following are excerpted from the BN Rules and Instructions for Train Dispatchers in effect at the time of the accident:

### 1. GENERAL

Safety is of the first importance.

DISPATCHER MUST:

- a. Report to and receive instructions from the Chief Dispatcher.

\* \* \*

- d. Ensure that nothing will interfere with safe practices in handling trains; issuing orders, lineups, track and time limits or other instructions.
- e. Not set up dangerous conditions in movement of trains and maintenance of way equipment. Dispatcher will be held accountable for any deviation from the rules and accepted safe practices.

\* \* \*

- i. Keep closely informed as to location and progress of trains and be familiar with consist of trains and work to be done enroute.

### 9. TRAIN SHEET RECORDS

\* \* \*

- d. Trains entered on train sheet before midnight that do not depart initial station or turnaround point until after midnight must be transferred to the next day's sheet and notation made: Transferred to sheet of (date).

### 11. TRAIN ORDERS

DISPATCHER MUST:

- a. Issue, transmit and record train orders as prescribed by the rules.

\* \* \*

- e. Guard against:
  1. Unsafe combinations,
  2. Improper sequences,
  3. Issuance of orders that may:

lead to confusion,  
be misunderstood,  
be difficult to comply with,  
be capable of more than one interpretation.

If there is doubt or lack of common understanding, annul the order, reword it, and issue with a new number.

## 12. FORMS OF TRAIN ORDERS

\* \* \*

### d. Form G

Before issuing running authority for an extra train, a careful examination must be made of the train sheet with regard to opposing extra trains and work extras and necessary orders in the prescribed form must be issued.

Safety Board investigators noted that trains Extra 6760 West, Extra 2560 West, Extra 6730 West, and Extra 7907 East, among other train information entries, were noted on the train dispatcher's train sheet dated June 13, 1984, with respect to proper identification, station times, and other pertinent data. The dispatcher's train sheet initiated at the onset of June 14, 1984, was noted to contain only, as per BN rules, data relevant to train Extra 7907 East, from the above mentioned train numbers; this was in accordance with BN rules. The dispatcher reported for duty about 10:35 p.m., on June 13, 1984, and the records indicate a proper transfer between him and the dispatcher relieved.

According to the BN, average weekly train movements through Motley consist of about 18 eastbound and 17 westbound freight trains.

### Track Information

At the accident site, the single main track is constructed of 115-pound RE section 2/ jointed rail. The rails are laid on double-shouldered tie plates atop 7-inch by 9-inch by 8-foot 6-inch treated hardwood crossties. The crossties are laid in a crushed granite ballast with compacted full tie cribs 3/. The ballast section extends 10 inches below the tie bottoms and more than 12 inches beyond the tie ends. Approaching the accident site in a westward direction, the track proceeds through a 1° 00' curve to the right, about 2,235 feet in length, then proceeds tangent (straight) for about 7,500 feet. The track profile is level throughout the accident vicinity. The track meets or exceeds the minimum standards of the FRA track safety standards for class 4 track. 4/ On the north side of the track structure, trees and dense high foliage grow to within about 20 to 30 feet of the track. Dense low foliage grows to within 10 feet of the track. On the south side of the track structure, scattered trees and shrubs also grow to within 10 feet of the track.

2/ 115-pound RE section refers to rail which nominally weighs 115 pounds per linear yard and is a standard rail section recommended for use by the American Railway Engineering Association.

3/ A tie crib is that space between two adjacent crossties in a railroad track.

4/ Title 49 CFR 213.9, "Classes of Track: operating speed limits," prescribes for Class 4 track a maximum allowable operating speed of 60 mph for freight trains.

### Medical and Pathological Information

The engineer and head brakeman of train Extra 7907 East, and the engineer of train Extra 6760 West died as a result of injuries sustained during the accident. The head brakeman of train Extra 6760 West sustained serious injuries as a result of jumping from the moving train immediately before the head-on collision.

The engineer of train No. Extra 7907 East died as a result of traumatic burns and blunt trauma injuries. The head brakeman of train Extra 7907 East died as a result of massive epidural (brain) hemorrhage, lacerations of the right lung, multiple compound fractures, and third-degree and fourth-degree burns. The engineer of train Extra 6760 West died as a result of massive impact traumatic injuries and burns. The head brakeman of train Extra 6760 West suffered a shattered left kneecap, multiple fractures of the left hand and wrist, and cuts and bruises. Three of the four rear-end crewmembers of the trains received minor injuries in the accident.

Toxicological analysis of the dispatcher on-duty at the time of the accident did not indicate the presence of alcohol or drugs. That dispatcher's supervisor was not toxicologically tested. Neither blood nor tissue samples were obtained from the engineer of train Extra 6760 West, because of the extreme severity of the fire injuries which destroyed most of the tissue. The body of the engineer of train Extra 7907 East was located about 39 hours after the accident, and the body of the head brakeman was located about 16 hours after the accident; both were buried beneath the coal ejected from the derailed coal-laden hopper cars. Toxicological analyses of blood specimens of the engineer by two separate laboratories indicated blood alcohol concentrations (BAC) of 0.13 percent and 0.138 percent, while a urine sample tested negative; analyses of blood and tissue specimens of the head brakeman indicated alcohol levels ranging from 0.012 percent for tissue specimens to 0.225 percent for blood specimens. Acetaldehyde was also detected in the specimen samples from both the engineer and the head brakeman. Specimen samples were analyzed separately by the Armed Forces Institute of Pathology (AFIP) and by the Minnesota Bureau of Criminal Apprehension (BCA). No evidence of use of any other controlled substance was indicated in the specimens. The AFIP informed the Safety Board that the presence of acetaldehyde "...indicates that bacterial contamination or tissue decomposition may have occurred." The toxicologist who performed the toxicological analysis at the BCA informed the Safety Board on August 22, 1984, that, regarding the analytical results for both the engineer and the head brakeman, in "...my opinion, that the majority, if not all of the alcohol that was found in the blood, is from bacterial decomposition..." There is a lack of clinical data regarding postmortem alcohol generation.

The rear-end crewmembers and the surviving head-end brakeman submitted to urinalysis testing for alcohol and drugs, which provided negative results. No evidence was developed during the investigation to indicate that any of the crewmembers had ingested alcoholic beverages while at Staples. Further, the investigation indicated that the locomotive engineer of train Extra 7907 East was known not to be a user of alcoholic beverages.

### Tests and Research

A postaccident inspection of the components of the track structure disclosed no defects that would have contributed to the accident.

No meaningful postaccident inspection of the locomotives of either train could be made because of the severity of the collision, derailment, and fire. Speed recording tapes on the locomotive units were destroyed in the fire. Postaccident tests of the cars of both trains that were not destroyed indicated that the automatic airbrake equipment functioned as intended, with no noted defects.

Sight distance tests were performed on June 16, 1984, between the hours of 10:03 p.m., and 11:05 p.m., to determine available sighting distance just before the collision. The weather at that time was dark and overcast. The tests employed two model SD-40-2 locomotive units arranged with the short hoods opposing as were the locomotive units involved in the accident. The tests indicated that the occupants of the westbound test locomotive unit were first able to sight the other test locomotive unit when the westbound test locomotive unit was about 1,327 feet from the approximate point of the accident impact. At that time, the westbound test unit was about 635 feet east of the end of the 1° 00' track curve to the right. The occupants of the eastbound test locomotive unit were first able to sight the other test locomotive unit when the eastbound test locomotive unit was about 1,281 feet from the approximate point of the accident impact. At that time, the test locomotive units were about 2,608 feet apart.

On July 4, 1984, a check of running time was performed on a westbound empty coal train, similar in consist and locomotive power to that of train Extra 6760 West. The check of running time indicated no apparent difficulty in maintaining the maximum allowable speed of 49 mph for that type of train. The conductor of train Extra 6760 West had stated that ". . .I felt we were doing a little bit under track speed. . ." just before the collision. On July 5, 1984, a check of running time was performed on an eastbound loaded coal train, similar in consist and locomotive power to that of train Extra 7907 East. The check of running time indicated that a speed of 35 to 40 mph would have been attained approaching the collision site. The conductor of train Extra 7907 East had stated that his estimate of speed was ". . .35 to 40 miles per hour. . ." just prior to the collision.

## ANALYSIS

### The Accident

The operating crews of trains Extra 7907 East and Extra 6760 West were qualified for their respective positions in accordance with BN requirements. There were no mechanical defects found that would have contributed to the accident. Further, there were no defects noted in the track structure that would have contributed to the accident.

The dispatcher's issuance of Train Order No. 85 to train Extra 7907 East from Staples to Carlton, when trains Extra 2560 West and Extra 6760 West still were occupying the single track main line gave all three trains authority to occupy the same track. None of the crewmembers of any of the three trains with this overlapping authority were notified by the dispatcher of their status. Trains Extra 7907 East and local freight train Extra 2560 West had overlapping authority for 24 minutes; trains Extra 7907 East and Extra 6760 West had overlapping authority for 1 hour 14 minutes.

The arrival at Staples of local freight train Extra 2560 West 20 minutes before Extra 7907 East departed Staples negated the conflict set up by the overlapping authority between those trains. However, train Extra 7907 East received its clearance 15 minutes before the local freight train arrived, and therefore could have departed Staples before the local freight train arrived.

Further, in the accident case, had there been an operator at Staples, which position is required to copy and read the content of train orders, including Train Order No. 85, rather than the position of TOCB clerk who was not required to do so, the overlap or conflict of train authorities is likely to become apparent, and the accident may have been prevented. While the TOCB clerk learned of train Extra 6760 West from conversation with the dispatcher about 12:13 a.m.--42 minutes before the accident--she had not read Train Order No. 85, and therefore, was not aware that a train meeting point had not been established for the opposing trains.

The dispatcher was required by BN Rules and Instructions for Train Dispatchers to examine the train sheets carefully with regard to opposing trains before issuing train orders. The dispatcher should have been aware of all trains in his territory, having performed the transfer from the dispatcher he relieved. Since the dispatcher issued Train Order No. 85 to train Extra 7907 East while trains Extra 2560 West and Extra 6760 West were still occupying the single track main line, he obviously failed to examine the train sheets carefully. The reference to train No. Extra 6730 West on Train Order No. 85, along with the omission of the other two westbound trains, indicates confusion on the part of the dispatcher in the performance of his assigned duties.

The operator at McGregor notified the dispatcher about 11:20 p.m. that train Extra 6760 West had passed that point, and about the same time, the operator at Brainerd informed him of train Extra 2560 West's passing that point. About 21 minutes later, the dispatcher erroneously issued Train Order No. 85 to train Extra 7907 East, and 9 minutes later issued the clearance for that train. Although the TOCB clerk at Staples relayed the arrival time of train Extra 2560 West at Staples, as 12:05 a.m., June 14, 1984, and the departure time of train Extra 7907 East at 12:25 a.m., the dispatcher did not recognize that he had established overlapping authorities between these two trains. The operator at Brainerd notified the dispatcher that train Extra 6760 West passed that location at 12:32 a.m., about 7 minutes after train Extra 7907 East departed Staples; however, the dispatcher still did not recognize that he had established overlapping authorities between those trains. The failure of the dispatcher to recognize these conflicts probably was due to his lack of experience and confusion brought about through the use of two trainsheets, one for June 13, 1984, and the other for June 14, 1984. The dispatcher may not have been able to properly correlate the information on the two train sheets. The Safety Board believes that the safety critical position of train dispatcher is one which requires the ability to correlate such information and make timely decisions based upon it. Management must regard the position of dispatcher with a high level of concern; this responsibility apparently was not fulfilled by BN management.

The engineers and head brakemen of trains Extra 7907 East and Extra 6760 West did not have sufficient time available to them to prevent the collision between their trains. The postaccident running time checks indicated a speed of 35 to 40 mph for train Extra 7907 East, with an available sight distance determined to be about 1,281 feet to the point of collision. At a speed of 35 mph, the maximum available time for the engineer and head brakeman to assess the situation and take action was about 25 seconds, while at 40 mph, about 22 seconds was available. With regard to train Extra 6760 West, the running time check indicated a speed of about 49 mph, with an available sight distance determined to be about 1,327 feet to the point of collision. At that speed, the engineer and head brakeman had about 18 seconds of available time before the collision. Since each train would have become visible to the occupants of the locomotive control cab of the other train simultaneously because of the straight-line-of-sight considerations, it is apparent that the actual time available before the collision would necessarily be equal for

the crews of both trains. The maximum allowable speeds of both trains indicate the time availability ranged from about 18 seconds to 22 seconds. Within this timeframe, both human and mechanical reaction would have had to have taken place. Although the rear-end crews of both trains stated the automatic airbrakes of their trains were applied in emergency before the collision probably by the head-end crews, there was not sufficient time for that braking to affect significantly the outcome of the accident.

### Survival Aspects

The emergency response personnel were prompt, efficient, and well organized in their response efforts, despite initial difficulties they encountered with restricted access to the accident site. The head brakeman of train Extra 6760 West was the only survivor, despite serious injuries, due to his having jumped off his locomotive unit prior to the collision. Because of the severity of the forces in the collision, the total destruction on impact, and the ensuing fire after the collision, the accident was not survivable in the lead locomotive unit cab of each train.

### Dispatcher Training Practices

The dispatcher involved in this accident, although he had been employed by BN 12 years, had no experience in railroad operations. As such, he also lacked experience with the territory for which he was responsible with dispatching functions. He had held only clerical positions before his nomination as a dispatcher trainee. The regional personnel director who nominated the involved dispatcher for the dispatcher training program, only having worked once as a stenographer in a dispatcher's office, had severely limited experience insofar as having firsthand knowledge of the requisites of the safety critical position of dispatcher. Further, despite having a pressing need for more dispatchers, the BN had not established nor documented any aptitude or other selection/screening criteria for the dispatching position to determine that any given individual would be capable of safely fulfilling the requirements of that position. A determination of such capability should have been of paramount importance in evaluating a dispatcher trainee applicant with no previous operations experience. Although the regional chief dispatcher and the manager of train operations reviewed the candidate's qualifications during the selection of the first 10 candidates, the Safety Board believes that the BN was deficient in the manner in which it selected the involved dispatcher for dispatcher training. Further, the statements of the BN officials involved in the nomination to training and final selection appear to be inconsistent with each other.

The 2-week-long dispatcher training course was preceded by a week-long period in which the trainees observed qualified dispatchers performing their duties. Since, at that point, the involved dispatcher had no operations experience to which to relate his observations, it is doubtful that he was able to fully comprehend the safety-related aspects of train dispatching. The classroom training itself consisted largely of instruction in the operating rules, those rules specifically pertaining to dispatchers, some instruction on and practice in issuing train orders, and dispatching simulation on the last day of classroom training. While this training may have been adequate for those trainees who were operationally oriented through their prior experience, the Safety Board believes it was not adequate to train an individual lacking prior operational experience. Further, the Safety Board believes that the manner employed by the BN to examine the trainees upon completion of their training did not adequately measure ability to understand and perform the functions of a dispatcher. Test questions were written without regard to measuring performance and test scores were evaluated without regard to the dispatcher trainee's

relative performance on train orders as they relate to the operating rules. The test used by the BN to evaluate the proficiency of the dispatcher trainees consisted of a 500-question examination; a 55-question section on train orders with an assigned value of 254 points, and a 445-question section on operating rules with an assigned value of 639 points. An overall score of less than 90 percent was failing. The involved dispatcher failed the first examination with a score of 84 percent (minus 40 points on trains orders and minus 99 points on operating rules). After additional training, he passed the very same examination with an overall score of 92 percent (minus 34 points on train orders and minus 35 points for operating rules). While registering a minor improvement in understanding trains orders, most improvement was registered in his knowledge of the operating rules. The minor improvement in train orders performance may have been due to the 12 days of on-the-job training he received between examinations. However, the improvement in operating rules performance which led to his passing the examination was probably due to the manner in which the test was structured; it followed the format of the book of operating rules, providing an opportunity for improvement through rote memorization of those rules. Moreover, his improvement regarding the train order portion of the test was minimal, and the understanding of train orders is a most important aspect of a dispatcher's job. Careful evaluation of the test results by the regional superintendent of rules who administered the training and testing should have raised questions by that official with regard to the involved dispatcher and his abilities to function safely as a dispatcher.

The time period during which overlapping authorities existed between trains Extra 7907 East and Extra 6760 West was 1 hour 14 minutes. Because the involved dispatcher had been recently qualified by the BN for his position, his minimal level of practical experience should have indicated a need for close supervision of his performance. Had the chief dispatcher on duty periodically checked the actions of the involved dispatcher during the shift being worked, the dispatcher's error in establishing overlapping authorities between trains could have been discovered, thereby preventing the accident. The Safety Board concludes that the BN did not provide the close level of supervision necessitated by the lack of experience of the involved dispatcher.

### Toxicological Aspects

Since the investigation developed no evidence of alcohol ingestion by the crewmembers, the locomotive engineer of train Extra 7907 East was a non-drinker, and expert toxicological opinion indicated that all of the alcohol could have been accounted for by postmortem decomposition, the Safety Board concludes that alcohol was not a causal factor in this accident. The length of time between the accident and the recovery of the bodies of the crewmembers killed in this accident suggests that decomposition was the source of the detected alcohol levels. The Safety Board is concerned that other railroad accidents may occur wherein the circumstances of such accidents will not be as clearly indicative of whether alcohol ingestion is a factor. The Safety Board believes that research to establish valid measurements of postmortem generation of alcohol is necessary, in view of drug and alcohol regulations proposed by the FRA which are supported wholeheartedly by the Safety Board. The FRA set forth a Notice of Proposed Rulemaking (NPRM), Docket No. RSOR-6, Notice No. 4, published June 12, 1984, regarding Federal Safety Standards for the Control of Alcohol and Drug Use in Railroad Operations. The Safety Board is concerned that the application of postaccident testing requirements may be a problem in railroad accidents where the recovery of toxicological specimens is delayed. The Safety Board believes that the Department of

Transportation (DOT) will need to address the lack of clinical data on postmortem alcohol generation, and urges the DOT to initiate necessary research to this end. However, the Safety Board does not view such research as a prerequisite to the implementation of the FRA's rules regarding use of alcohol and/or drugs in railroad operations.

Further, in its comments to the FRA concerning the NPRM, the Safety Board advised the FRA that:

\* \* \* \* \*

Although the Safety Board recognizes the difficult task of defining railroad employees who would be covered under this rule, we believe FRA should include all employees directly involved in an accident. This may well mean that employees other than "covered employees" under the Hours-of-Service Act need to be tested. For example, if the traincrew reported to a supervisor who did not detect alcohol there may be a need to test that supervisor.

- a. There are varying interpretations by railroads as to whom is covered by the Hours of Service Act (45 USC 61-64b). The definition in subparagraph 218.101(b) should be explicitly defined as to "covered employees." For example, some railroads do not consider their operating department officials to be covered by the act.

\* \* \* \* \*

While the Safety Board has no reason to believe the dispatcher's supervisor was impaired, it must be noted that the supervisor was not toxicologically tested although all other employees involved in the accident were tested. The Safety Board strongly urges the FRA to take these circumstances into account in adopting the proposed rule.

## CONCLUSIONS

### Findings

1. The Burlington Northern Railroad Company operates trains through Motley, Minnesota, by timetable, special instructions, and train orders. The single track main line is not signalized.
2. The Train Order Crew Board (TOCB) clerk at Staples receives copies of train orders via a telecopier facsimile machine to relay to train crewmembers, but is not required to read the content of train orders so transmitted.
3. The Burlington Northern Railroad had need for additional dispatchers at its facility in Minneapolis due to a consolidation of dispatching functions to that location; several of the then-current dispatchers had declined relocation to that area.
4. The dispatcher who was controlling the movements of the trains involved in the head-on collision was working in his second tour of duty since being promoted to that position; prior to dispatcher training he had no operating experience.



5. The issuance by the dispatcher of a train order to eastbound train Extra 7907 East from Staples to Carlton while two westbound trains (Extras 2560 and 6760 West) were still occupying the single track main line between those points, constituted an overlap of authorities between those trains.
6. The time period of overlapping authority between trains Extra 7907 East and Extra 2560 West was 24 minutes; the time period of overlapping authority between trains Extra 7907 East and Extra 6760 West was 1 hour 14 minutes.
7. Had the Burlington Northern Railroad required the individual at Staples, who relayed the train orders to the train crewmembers, to copy and read the content of the orders, the overlapping authorities of the train orders is likely to have become apparent.
8. The dispatcher on-duty at the time of the accident should have been aware of all trains operating in his territory, because he had transferred information from the dispatcher he had relieved and he was required to carefully examine the train sheets with regard to opposing trains prior to issuing train orders.
9. The failure of the dispatcher to recognize the overlapping authorities of opposing trains may have been due to his lack of experience, inadequate training, and resultant confusion from working with two train sheets, one for June 13 and one for June 14, 1984.
10. Safety critical positions, such as that of train dispatcher, are positions which must be regarded with extreme discretion by management.
11. The Burlington Northern Railroad, although having a need for additional dispatchers, had not established any aptitude or selection/screening criteria to determine that an individual would be capable of fulfilling the requirements of the position of dispatcher.
12. The classroom dispatcher training program established by the Burlington Northern Railroad consisted largely of instruction in operating rules and rules pertaining specifically to dispatchers.
13. The manner employed by the Burlington Northern Railroad to examine the dispatcher trainees upon completion of training did not measure adequately knowledge and skill in performing dispatcher functions.
14. The Burlington Northern Railroad did not provide the close level of supervision necessitated by the lack of experience of the involved dispatcher.
15. The respective engineers and head brakemen of trains Extra 7907 East and Extra 6760 West did not have sufficient time available to them to prevent the collision of their trains.
16. The respective engineers and/or head brakemen of trains Extra 7907 East and Extra 6760 West applied the automatic air brakes of their trains in emergency prior to the collision.

17. No mechanical defects were found in either train that would have contributed to the accident.
18. No defects were found in the track structure that would have contributed to the accident.
19. Toxicological analysis of blood and tissue samples from the engineer and head brakeman of train No. Extra 7907 East indicated bacterial contamination or tissue decomposition. The investigation did not reveal any evidence that any of the crewmembers had ingested alcohol before the accident, that the locomotive engineer was a non-drinker, or that use of alcohol could be considered a factor in the accident.
20. The emergency response personnel were prompt, efficient, and well organized in their response efforts, despite the initial difficulties encountered with restricted access to the accident site.
21. There is a lack of clinical data on postmortem alcohol generation.

### Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the Burlington Northern Railroad's inadequate personnel selection criteria which resulted in the placement of an individual without sufficient training and supervision into the safety critical position of train dispatcher.

### **RECOMMENDATIONS**

As a result of this investigation, the National Transportation Safety Board made the following recommendations:

--to the Burlington Northern Railroad Company:

Establish and document aptitude and other performance oriented selection/screening criteria which assure that individuals considered for safety critical positions such as train dispatchers are capable of fulfilling the requirements of that position. (Class II, Priority Action) (R-85-43)

Revise the training and testing procedures for individuals to be employed in safety critical positions such as train dispatchers to better assure the safety requirements of those positions are fulfilled. (Class II, Priority Action) (R-85-44)

Review and revise, as necessary, supervisory procedures for individuals employed in safety critical positions such as train dispatchers, especially newly promoted employees, to better assure the safety requirements of those positions are fulfilled. (Class II, Priority Action) (R-85-45)

Assess locations where train orders are delivered to train crewmembers and which are not staffed with individuals required to copy and read the content of those orders to determine the safety enhancement of staffing those locations with individuals so required. (Class II, Priority Action) (R-85-46)

--to the Department of Transportation:

Initiate research designed to expand the clinical base of knowledge regarding the postmortem generation of alcohol levels due to microbial action in order to relate that knowledge to postaccident toxicological testing requirements for the investigation of transportation accidents. (Class II, Priority Action) (R-85-24)

--to the Federal Railroad Administration:

In conjunction with the Association of American Railroads, initiate a program designed to establish and document aptitude and other performance oriented selection/screening criteria, training, and testing procedures for individuals to be employed in safety critical positions such as train dispatchers. (Class II, Priority Action) (R-85-47)

--to the Associations of American Railroads:

In conjunction with the Federal Railroad Administration, initiate a program designed to establish and document aptitude and other performance oriented selection/screening criteria, training, and testing procedures for individuals to be employed in safety critical positions such as train dispatchers. (Class II, Priority Action) (R-85-48)

**BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

/s/ JIM BURNETT  
Chairman

/s/ PATRICIA A. GOLDMAN  
Vice Chairman

G. H. PATRICK BURSLEY, Member, filed the following concurring and dissenting statement:

I agree with my colleagues that the Burlington Northern Railroad's (BN) procedures for selecting candidates for safety critical positions such as train dispatchers were inadequate, and I agree also that the BN's training and testing program requires improvement, particularly if candidates without operating experience are to continue to be trained. I believe, however, that these two factors were too remote to constitute a part of the probable cause of this accident. The fact is that the involved dispatcher successfully completed the course of instruction, and there was no evidence to give BN any clear indication he was not qualified to undertake the duties of a train dispatcher. As a matter of fact, several people in his class had a lower class ranking. What was known was that the dispatcher's lack of operating experience in the railroad made it more difficult for him to translate theory into practice, and close supervision was provided on his first tour of duty. The core of the problem in my view is that close supervision was not continued until it was clear it was not needed or that the dispatcher would not be able to perform satisfactorily. Accordingly, I believe that the probable cause should be:

The National Transportation Safety Board determines that the probable cause of this accident was the Burlington Northern Railroad's assignment of an inexperienced individual to the safety critical position of train dispatcher without providing adequate monitoring of his performance.

/s/ G. H. PATRICK BURSLEY  
Member

April 30, 1985

**APPENDIXES**

**APPENDIX A**

**INVESTIGATION**

The National Transportation Safety Board was notified of the accident about 4:57 a.m., on June 14, 1984. The Safety Board immediately dispatched investigators from its Washington, D. C., headquarters, and from its Chicago, Illinois, and Denver, Colorado, field offices to the site.

Groups were formed to investigate the human performance, mechanical, operational, survival factors, toxicological, and track structure aspects of the accident. The groups were composed of personnel from the Burlington Northern Railroad, the Federal Railroad Administration, and emergency response personnel, and were directed by Safety Board investigators.

A deposition proceeding was held in Superior, Wisconsin, on August 21-22, 1984. Sworn testimony of the facts of the accident was taken from 13 witnesses. Parties to the proceeding were the Burlington Northern Railroad, the Federal Railroad Administration, the American Train Dispatcher's Association, the Brotherhood of Locomotive Engineers, and the United Transportation Union.

## APPENDIX B

### PERSONNEL INFORMATION

#### Dispatcher, Minneapolis

The dispatcher was employed by the Burlington Northern Railroad (BN) on August 2, 1972 as an extra clerk. He worked various clerical positions such as extra clerk, maintenance-of-way clerk, and word processing clerk until his appointment to dispatcher training on March 12, 1984. After passing his rules examinations on May 14, 1984, he was promoted to the position of extra dispatcher on June 6, 1984.

#### Chief Dispatcher, Minneapolis

The chief dispatcher on duty at the time of the accident was first employed by the Northern Pacific Railway (NP), a predecessor company of the BN, on May 3, 1954, as a telegrapher, and was promoted to dispatcher on June 6, 1961. He was promoted to an exempt position as a supervisor of train and power operations on July 6, 1980. He became a chief dispatcher on May 1, 1981, at Superior, Wisconsin, and was transferred to chief dispatcher in Minneapolis, Minnesota, in January 1984.

#### Train Order Crew Board Clerk, Staples

The Train Order Crew Board (TOCB) clerk was employed by the BN on August 20, 1973, as an extra clerk. Prior to that, she had been employed by the Minnesota Transfer Railway Company, for about 4 years, as a chief clerk. She was assigned a train and engine crew caller position on September 4, 1975, and the TOCB clerk position on November 9, 1983. She was current on BN operating rules.

#### Train Order Operator, Brainerd

The operator was employed by the Great Northern Railroad (GN), a predecessor company of BN, on April 26, 1951, as a student telegrapher. He held positions of telegrapher, telegrapher/agent, agent, and train order operator at Brainerd. He was current on BN operating rules.

#### Engineer, Extra 7907 East

The engineer was employed by the NP, on September 19, 1945, as a laborer. He became a student fireman on July 17, 1948, and was promoted to fireman on August 28, 1948. He was promoted to locomotive engineer on June 14, 1960. He was current on BN operating rules.

#### Conductor, Extra 7907 East

The conductor was employed by the GN on September 22, 1952, as a student fireman. He became a brakeman on May 18, 1963, and was promoted to conductor on November 15, 1972. He was current on BN operating rules.

#### Head Brakeman, Extra 7907 East

The head brakeman was employed by the BN on September 2, 1972, as a switchman/brakeman. He was current on BN operating rules.

Rear Brakeman, Extra 7907 East

The rear brakeman was employed by the GN on July 24, 1969, as a switchman. On March 3, 1970, he became a switchman/brakeman and on October 16, 1981, a brakeman. He was current on BN operating rules.

Engineer, Extra 6760 West

The engineer was employed by the GN on June 29, 1951, as a student fireman, and was promoted to fireman on July 10, 1951. He was promoted to locomotive engineer on July 11, 1968. He was current on BN operating rules.

Conductor, Extra 6760 West

The conductor was employed by the GN on June 23, 1965, as a brakeman. He was promoted to conductor on November 15, 1972. He was current on BN operating rules.

Head Brakeman, Extra 6760 West

The head brakeman was employed by the BN on May 6, 1976, as a maintenance-of-way laborer. On June 2, 1978, he became a switchman/brakeman. He was current on BN operating rules.

Rear Brakeman, Extra 6760 West

The rear brakeman was employed by the BN on May 24, 1973, as a switchman/brakeman. He was promoted to conductor on March 7, 1978. He was current on BN operating rules.

APPENDIX C

TRAIN ORDER NO. 85

TRAIN ORDER No. 85



LOCATION <i>Coon Creek</i>	DATE <i>June 13 1984</i>
TO <i>C&amp;E Eng 7907 At Staples</i>	
TO	
TO	
TO	
TO	

*After Extra 6730 West Has Arrived  
Staples Eng 7907 Run Extra Staples To  
Carlton*

*JLC*

TIME COMPLETED <i>1141 PM</i>	OPERATOR <i>PAGE</i>
----------------------------------	-------------------------



APPENDIX D

TRAIN ORDER NO. 79

TRAIN ORDER No. 79



LOCATION	<i>Carlton</i>	DATE	<i>June 13 1984</i>
TO			
TO	<i>CRG Long 6760</i>		
TO			
TO			
TO			

*Long 6760*  
*Now extra Carlton to Staples.*  
*Extra 2560 west*  
*Now left Carlton on order no*  
*75 of June 13*  
*EWM*

TIME COMPLETED	<i>9:29 pm</i>	OPERATOR	<i>Allen</i>
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APPENDIX E

DISPATCHER TRAINING SCHEDULE

TWIN CITIES REGION  
RULES TRAINING STUDENT TRAIN DISPATCHERS

FIRST WEEK

<u>DAY</u>	<u>MATERIAL COVERED</u>
1	Introduction. Consolidated Code of Operating Rules: General Notice, General Rules A, B, C, D, G and M, Operating Rules page 13, Rules 1, 2, 3, 3(A), 3(B), 4, 4(A), 4(B), 5, 6, 6(A), 7, 8j, 9, 10, 11, and 12. Video and tape slide programs if time allows. Homework - Lesson 1.
2	Review Lesson 1. Consolidated Code of Operating Rules: 14, 14(A), 17, 17(A), 19, 19(A), 19(B), 19(C), 20, S-20, 21, 23, 26, 27, 28, 30, 70, S-71, D-71, 81, 82, S-83, S-83(A), D-83, 83(A), 83(B), 83(C), 84, 85, 85(A), 86, S-87, S-88, 89 and S-89. Homework - Lesson 2 and Study for Rules Test 1.
3	Rules Test 1 and review. Review Lesson 2. Consolidated Code of Operating Rules: 91, 91(A), D-91, 93, 97, 97(A), 99, 99(A), 99(B), 99(C), 101, 101(A), 101(C), 102, 102(A), 102(B), 103(B), 103(E), 104, 104(A), 104(B), 104(C), 104(E), 104(H), 104(I), D-104, 105, 106, 107, 108, 109, D-151, D-152, 200, 201, 201(A), 202, 203, 204, 205, 206, 207, 208, 208(A), 208(B), 209, 210, 211, 212, 213, 214, 215 and 216. Homework - Lesson 3.
4	Review Lesson 3. Consolidated Code of Operating Rules: 217, 218, 219, 220, 220(A), 220(B), 221, 222(F), 222(G), 222(H), 223, 224, S-225, Block and Interlocking Signals pages 106 thru 111, 244, 245, 246, 248, 249, 251, 252, 253, 254, 261, 262, 263 and 264. Issue train orders for students to copy and repeat. If time have students issue orders. Homework - Lesson 4 and review for Rules Test 2.

- 5 Rules Test 2 and review.  
Review Lesson 4.  
Practical application of "Rules For Movement by Train Orders" by having each student issue train orders to be copied and repeated by other students. Have each student issue two orders if time permits.  
Homework - Lesson 5.

SECOND WEEK

DAY            MATERIAL COVERED

- 6 Review Lesson 5.  
Consolidated Code of Operating Rules: 265, 266, 267, 268, 268(A), 269, 269(A), 270, 271, 272, 275, 275(A), 276, 280, 281, 282, 282(A), 505, 509, S-510, 511, 512, 513, 514, 514(A), 515, 605, 605(A), 606, 607, 608, 609, 610, 611, 612, 613, Radio Rules 650 thru 674, 700, 700(A), 700(B), 701, 701(A), 701(B), 701(C), 702, 702(B), 702(C), 703, 704, 705, 706, 706(A), 707, 708, 709, 711, 712, 713(B), 713(C), 716, 717, 718, 719, 720, 721, 721(A), 722, 723, 724, 725, 726, 727, 728, 729, 800, 801, 802, 803, 803(A), 804, 805(D), 806, 807, 903, 952, 953, 953(A), 954, 956, 957, 958, 959, and 990.  
Video tape on proper use of radios.  
Homework - Lesson 6.
- 7 Review Lesson 6.  
Review signal rules 244 through 515.  
Tour Signal Training Center explaining CTC panel, duel control switch, electric lock switch and block signals, cover Maintenance of Way Rules from Dispatchers Study Guide and forms of train orders from Consolidated Code of Operating Rules, Train Dispatchers Manual and Dispatcher Study Guide. Try to go as far as Form S-E.  
Homework - Lesson 7 and study for Rules Test 3.

- 8 Rules Test 3 and review.  
Review Lesson 7.  
Finish forms of train orders in Consolidated Code of Operating Rules, Train Dispatchers Manual and Dispatchers Study Guide.  
Additional forms of train orders from Train Dispatchers Manual.  
Using slides on train orders ask questions on what order requires, addresses, clearing times, superiority, etc.  
Start practical application of all forms of train orders by simulation. Give students two problems and have them issue the proper orders (make a meet between two opposing extra trains, then change meeting point).  
Train Dispatchers Manual Items 1 through 12e.  
Homework - Study for Test 5 and study forms of trains orders.
- 9 Rules Test 5 and review.  
Train Dispatchers Manual Items 12F through 37.  
Federal Hours of Service Law from Study Guide.  
Set up train sheets and train order books for simulation.  
Have students issue two slow orders to be used the next day also issue a Form Y Order.  
Homework - Study for Rules Test 6.

DAYMATERIAL COVERED

- 10 Rules Test 6 and review.  
Dispatching simulation remainder of day.  
Pass out messages from Chief Dispatcher assigning students where and when to report for their on the job training.  
Remind them to continue studying for Final Examination which will be a 500 question essay type examination.