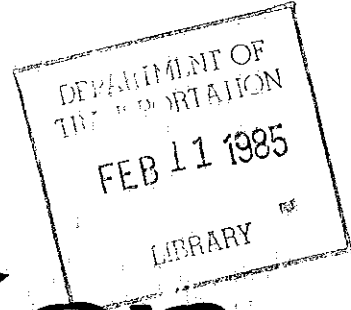


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Railroad Accident Investigation Reports



REPORT NO. 79-11
BURLINGTON NORTHERN INCORPORATED
ANTELOPE, NORTH DAKOTA
SEPTEMBER 7, 1978



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION
Office of Safety

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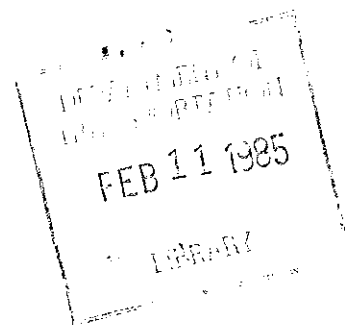
~~RAILROAD ACCIDENT INVESTIGATION~~

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~~FEDERAL RAILROAD ADMINISTRATION~~

OFFICE OF SAFETY.

WASHINGTON, D. C. 20590

FEDERAL RAILROAD ADMINISTRATION
OFFICE OF SAFETY

RAILROAD ACCIDENT INVESTIGATION
ACCIDENT REPORT NO. 79-11

BURLINGTON NORTHERN
ANTELOPE, NORTH DAKOTA
SEPTEMBER 7, 1978

Synopsis

On September 7, 1978, at approximately 2:15 p.m., an eastbound Burlington Northern freight train struck an on-track tamping machine, 1.9 miles west of Antelope, North Dakota. At the time of the accident, the weather was clear.

Casualties

The machine operator and one track laborer of the tamping machine crew were fatally injured in the accident. A second track laborer was slightly injured when struck by flying debris. There were no injuries to crew members of the freight train.

Cause

The accident was caused by the failure of the engineer of the freight train to operate that train in accordance with carrier operating rules. A contributing cause was the failure of the track foreman to provide proper and complete protection as required by the carrier's Maintenance of Way Department rules.

Location and Method of Operation

The accident occurred on that part of the railroad extending from Dickinson to Mandan, North Dakota, a distance of 109.5 miles. This is a single track line over which trains are operated by authority of timetable, train orders and an automatic block signal system. The collision occurred at Mile Post 81.1, 1.9 miles west of Antelope and 28.4 miles east of Dickinson.

Track

From the west there is in succession a tangent of 280 feet, and a one degree 30 minute curve to the left 1,421 feet to the point of the accident, and for 399 feet beyond. The grade in the accident area is 0.6 percent ascending eastward for about 0.6 of a mile to the point of impact. Beyond this point, the grade is level.

Maximum Authorized Speed

The maximum authorized speed for train movement in the accident area is 40 m.p.h.

Sight Distance

To the north of the track and on the inside of the curve there is a low hill 10 to 15 feet high, and telephone poles paralleling the track structure. These obstructions restrict sight distance eastward to about 1,650 feet.

Signals

Train movement through the accident area where men and equipment were working on tracks was controlled by maintenance of way yellow-red, red, and green flags. These flags were 18" x 18" made of a plastic material with wood or metal flagsticks on each side to support and keep the flag taut. Flags of this type are displayed next to, and at right angles to, the track. Applicable names (colors) and indications are as follows:

<u>Name</u>	<u>Indication</u>
Yellow-Red	Be prepared to stop before any part of train or engine passes a red flag or red light two miles beyond the yellow-red flag. In the absence of a red signal at that location a train or engine may proceed at a speed of not more than 10 m.p.h. unless different speed is authorized by Form Y train order.
Red	Except when governed by Form Y train order, a train or engine finding a red flag or a red light displayed between the rails of the track or to the right of the track as viewed from an approaching train must stop before any part of the train or engine passes the red signal and must not proceed until a proceed signal given with a yellow flag or yellow light is received or verbal permission is received.
Green	A green flag displayed to the right of the track as viewed from an approaching train indicates the end of the restriction.

Applicable Rules

- Rule 14 A train or engine finding a yellow-red flag displayed to the right of the track as viewed from an approaching train must be prepared to stop before any part of the train or engine passes a red flag or red light two miles beyond the yellow-red flag. In the absence of a red signal at that location a train or engine may proceed at a speed of not more than 10 MPH unless a different speed is specified by Form Y train order. Speed of train must not be increased until entire train has passed or green flag is displayed to the right of track.

Rule 14(A) Except when governed by Form Y train order, a train or engine finding a red flag or a red light displayed between the rails of the track or to the right of the track as viewed from an approaching train must stop before any part of the train or engine passes the red signal and must not proceed until a proceed signal given with a yellow flag or yellow light is received or verbal permission is received.

Red signal must be replaced when found between the rails. (Consolidated Code of Operating Rules)

Protection For Obstructed Or Impassable Track

Rule 14 If the track is to be obstructed or to be made impassable, or is found to be impassable, a red flag or a red light must be displayed in both directions to the right of the track as viewed from an approaching train, not less than 800 feet from the obstructed or impassable track. At a point two miles in advance of the red signal, a yellow-red flag must be displayed to the right of the track as viewed from an approaching train.

. . .

Torpedoes must be placed 800 feet in advance of the red signal; also 800 feet in advance of the yellow-red signal for each train, unless a train order has been issued covering the condition.

. . .

Rule 14(B) When a Form Y train order is to be placed, employe in charge of work must notify train dispatcher, furnishing time, date, location and limits where such protection is desired. Work limits requested should be as short as practicable, if necessary to accomplish this, a second order should be requested for second half of work period. When train order has been issued, employe in charge will be advised the order number, location and limits, speed, and time order is in effect, or be furnished copy of the order.

A yellow-red flag must be placed two miles in advance of work limits and be in place during the times specified. Foreman must display red signal whenever track is impassable or obstructed by work equipment. A green flag displayed to the right of the track indicates the end of the restriction.

When necessary to place a train order covering a slow track condition within the limits of a Form Y order, track flags must be placed covering such condition....

Form Y Train Order

Maintenance of Way Conditional Stop

Men and equipment on (main) track between MP 99 and MP 105 between (Oregon) and (Stratford) from 8:01 a.m. until 12:01 p.m. All trains on (main) track proceed through these limits at reduced speed unless a different speed is verbally authorized by employe in charge or entire train has passed a green flag.

When a train or engine finds a red flag displayed to the right of the track as viewed from an approaching train within the limits of a Form Y train order, stop must be made before any part of train or engine passes the red signal unless a proceed signal is given with a yellow flag or verbal permission is given in the following form:

"BN Railway foreman calling Extra 232 East about Order No. _____." When engineer answers, the foreman will state: "Extra 232 East may pass red signal at (Location) without stopping."

A different speed than that shown in the train order may be authorized by adding: "Proceed at _____ MPH" or "Proceed at normal speed." These instructions must be repeated by the engineer. (Burlington Northern, Rules of the Maintenance of Way Department, Operating Department)

Circumstances Prior to the AccidentExtra 6833 East

The crew of this train, an engineer, a conductor, and two brakemen, having completed the required off-duty period, went on duty on the day of the accident at 11:20 a.m. at Dickenson, North Dakota. The train for which they were called, Extra 6833 East, an eastward unit coal train, consisted of four EMD SD-40-2 type diesel-electric locomotive units, 106 loaded hopper cars and a caboose. The train departed Dickenson at 1:20 p.m., after the performance of the proper air brake test. The engineer was operating the controls from the right side of the leading locomotive unit. The front brakeman was located on the left side of the same control compartment and the conductor and the rear brakeman were in the caboose.

Included among the train orders in the possession of this crew were three Form Y train orders. One train order, No. 804, read as follows:

"Men and equipment on main track between Mile Post 70.5 and Mile Post 77.2 between Eagle Nest and Antelope from 8:01 a.m. until 6:01 p.m. All trains on main track proceed through these limits at reduced speed unless a different speed is verbally authorized by employee in charge or entire train passes a green flag."

Near Mile Post 87, about 19 miles east of Dickenson, the engineer and the front brakeman observed a yellow-red flag displayed to the right of the track. No track torpedoes were detonated in the area of the signal flag. The train engineer, assuming that the flag was displayed in conjunction with Form Y Order No. 804, made no attempt to comply with the speed restrictions of Rule 14. He made radio contact with the track force protected by that order, was advised that the track machine was in the clear at Hebron, and operated the train at normal speed through the restricted area.

Tamping Machine X-54-0002

Prior to the accident, a track force, consisting of a foreman, machine operator and six laborers, was working with on-track maintenance of way equipment in the vicinity of Mile Post 81.1. The equipment being used was a Jackson Servo Chief Power tamper measuring about 25 feet in length, 8 feet in width, 8.9 feet in height and weighing approximately 15 tons. This machine was insulated so as not to actuate block signals when occupying signal track.

The track foreman had in his possession a copy of Train Location Line-up No. 2, copied at Richardson, North Dakota at 11:59 a.m., September 7, 1978. This line-up indicated that, in addition to other train movements, Extra 6833 East would leave Dickenson at 12:15 p.m. and pass Richardson at 1:01 p.m.

The track force was occupying the main track under the protection of a yellow-red flag displayed at Mile Post 87, and a red flag displayed at Mile Post 81.2.

The foreman of the work gang stated that he did not obtain or request a Form Y Order for his track force because he was unsure of where his force would be working on the day of the accident. Form Y Orders are usually requested the night before the work begins.

A second track force was working east of the accident site. This force was protected under Form Y Order No. 804, and had positioned its yellow-red flag at Mile Post 79.2. Distances protected under this order extended eastward from Mile Post 77.2 to Mile Post 70.5.

The Accident

Extra 6833 East approached the accident area at a speed of 45 m.p.h., as indicated by the tape of the speed recording device on the second locomotive unit in the consist. Both the first and the third locomotive units were equipped with speed recording devices but, in both cases, the tape had expired on each unit. Front end crew members observed the automatic signal at Mile Post 81.6 displaying a green signal. East of that signal, a red wayside flag was observed to the right of the track. This signal flag was called by the front brakemen and acknowledged by the engineer who, again assuming that the flag was displayed in conjunction with Form Y Order No. 804, made no attempt to stop his train. Before reaching the red flag, on-track equipment was observed occupying the main track. The engineer initiated an emergency brake application, and sounded the locomotive horn. The collision occurred before the speed of the train was materially reduced.

Work crew members were unable to hear the approaching train because of the noise produced by the tamping machine.

The collision moved the tamper eastward for a distance of 1,347 feet. Neither the tamper nor any train equipment was derailed in the accident.

Damages

The leading locomotive unit was slightly damaged. The tamping machine was destroyed.

Post Accident Investigation and Analysis

Two separate track forces, both using on-track equipment, were working in the same general area on the day of the accident. The one force involved in the collision was working to the west of the second work crew at Mile Post 81.1. This crew was protected by wayside signal flags. The second track force, working between Mile Posts 77.2 and 70.5, was protected by both wayside signals and a Form Y Train Order No. 804.

The engineer of Extra 6833 East held, in addition to other train orders, Train Order No. 802, a Form Y Order restricting movements between Mile Posts 28.8 and 30.1. In addition to this, he had received No. 803, a Form Y Order restricting movements between Mile Posts 36.5 and 37.9, and No. 804, a Form Y Order restricting movements between Mile Posts 70.5 and 77.2. He was unaware of any other track forces working on the subdivision.

Approaching the accident area, the engineer observed a yellow-red flag at Mile Post 87. The engineer assumed that the signal was displayed in conjunction with Form Y Order No. 804, although the flag was located 9.8 miles west of the Form Y Order's western limit. He then contacted the machine operator of the second track force by radio and received verbal permission to pass through the limits specified in Order 804 at normal speed.

At Mile Post 82.2, the engineer encountered a red flag positioned to the right of the track. Again assuming that this flag was displayed in conjunction with Form Y Order No. 804, he made no attempt to stop his train until the on-track equipment came into view.

The section foreman of the first work crew did not replace torpedoes detonated by preceding trains. He also did not change the position of his wayside flags to correlate with the movement of his work crew.

Findings

1. The accident was caused by the failure of the engineer of Extra 6833 East to comply with the requirements of Rule 14, and to stop his train short of a displayed red wayside signal flag.

2. The track foreman did not provide the proper and complete protection for his crew as required by the carrier's Maintenance of Way Department rules.

Dated at Washington, D. C., this
12th Day of December 1979
by the Federal Railroad Administration

J. W. Walsh
Chairman
Railroad Safety Board