

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

RAILROAD ACCIDENT REPORT

**REAR END COLLISION OF AN
ALASKA RAILROAD FREIGHT TRAIN
WITH A PASSENGER TRAIN**

**NEAR HURRICANE, ALASKA
JULY 5, 1975**

REPORT NUMBER: NTSB-RAR-76-3

UNITED STATES GOVERNMENT

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16. Abstract <p>About 3:46 p.m. on July 5, 1975, an Alaska Railroad freight train, Extra 1502 South, collided with the rear of passenger train No. 5, which had stopped south of Hurricane, Alaska, to permit the passengers on the train to view Mt. McKinley. All cars of the passenger train and the first four locomotive units of the freight train were derailed. Sixty-two persons were injured and one of the injured subsequently died.</p> <p>The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer of Extra 1502 South to operate the braking system on the locomotive properly and the failures of both traincrews to comply with railroad operating rules.</p> <p>As a result of its investigation, the Safety Board made three recommendations to the Federal Railroad Administration concerning improvement and compliance with operating rules and a modification of locomotive brake valves.</p>					
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FOREWORD

This report is based upon an investigation by the National Transportation Safety Board under the authority of the Independent Safety Board Act of 1974.

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SYNOPSIS

About 3:46 p.m. on July 5, 1975, an Alaska Railroad freight train, Extra 1502 South, collided with the rear of southbound passenger train No. 5, which had stopped south of Hurricane, Alaska, to permit the passengers on the train to view Mt. McKinley. All cars of the passenger train and the first four locomotive units of the freight train were derailed. Sixty-two persons were injured and one person died as a result of the collision. The estimated cost of damages was over \$558,000.

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer of Extra 1502 South to operate the braking system on the locomotive properly and the failures of both traincrews to comply with railroad operating rules.

FACTS

The Accident

Passenger Train No. 5 -- About 12:40 p.m. on July 5, 1975, Alaska Railroad (ARR) passenger train No. 5 departed Healy, Alaska, on time. At Colorado, 61 miles south of Healy, No. 5 passed Extra 1502 South.

When train No. 5 was near Colorado, the conductor instructed the front brakeman to deliver a train order to the flagman. When he arrived at the rear car, the front brakeman delivered the train order and assisted the flagman to make temporary repairs to the air conditioning system of that car. Then they checked the malfunctioning air conditioning system on the 10th car. They then discussed whether it was a good time for the flagman to eat lunch. The flagman then went forward to the diner, the sixth car. The front brakeman remained on the 10th car and continued to work on the air conditioning system.

As No. 5 approached Hurricane, 15.7 miles south of Colorado, the conductor radioed instructions to the engineer to stop the train 2.2 miles south of Hurricane so that passengers could view and photograph Mt. McKinley. ^{1/} None of the other crewmembers were told about the planned stop.

No. 5 made a scheduled stop at Hurricane and departed at 3:41 p.m., 6 minutes later than the timetable schedule of 3:35 p.m. No crewmember left a lighted fusee at Hurricane. ^{2/} The train proceeded to the mountain stop, where it was stopped for about 1 minute.

Extra 1502 South -- On July 5, 1975, at 12:27 a.m., Extra 1502 South, a freight train consisting of five locomotive units, nine empty and two loaded cars, departed Healy after the brakes had been tested by the traincrew. The train was authorized by train order to run ahead of No. 5 from Healy to Curry -- a distance of 100 miles. However, according to the rules of the carrier, the extra train was still required to permit the superior train to pass if the extra train was delayed and, consequently, was operating on the schedule of the superior train.

Since Extra 1502 South had been delayed en route, and since work had to be performed at Colorado, the conductor decided to allow No. 5 to pass at Colorado. Consequently, the train order was fulfilled when No. 5 passed Extra 1502 South. Extra 1502 South departed Colorado at 3:15 p.m. At 3:27 p.m., Extra 1502 South passed Honolulu; the conductor reported the passing as required, and while so doing was informed by the train dispatcher that a train order would be transmitted to Extra 1502 South when it arrived at Hurricane.

Extra 1502 South passed Hurricane at about 3:43 p.m. and did not stop although it was required to do so. The conductor reported to the train dispatcher that the train was at Hurricane and that he was ready to copy the train order. The engineer heard the radio conversation between the conductor and the train dispatcher concerning the transmittal of the train order, and was attempting to copy the order as the train moved southward from Hurricane.

The Collision -- The crew of Extra 1502 South first saw No. 5 as the locomotive rounded a 1° curve about 3,000 feet north of the rear of No. 5. The speed of Extra 1502 South at that time was 40 mph. The engineer said that he applied the brake lightly, because he believed that he had sufficient distance in which to stop the train. After seeing No. 5, the front brakeman asked the engineer if he could copy the order

^{1/} In its Operating Circular No. 9, the Alaska Railroad made provisions for passenger trains to be stopped so tourists could view the mountain. (See Appendix C.)
^{2/} The 10-minute fusee would have insured a 10-minute separation of the trains.

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but the engineer refused the request. Since the train was approaching a road crossing and the engineer still appeared to be busy, the front brakeman blew the crossing whistle signal. The front brakeman became concerned when the locomotive was about 1,500 feet north of No. 5 and still moving at a considerable speed. He reached for the emergency valve, but the engineer applied the brakes in emergency before the front brakemen could operate the valve. After the engineer applied the emergency brake, he moved the independent brake valve handle forward to the full application position and then downward on the release bail; this nullified the emergency application on the locomotive.

Extra 1502 South collided with the rear of No. 5 at a speed of approximately 25 mph, just as No. 5 had begun to move.

Neither of the crewmembers on the locomotive of Extra 1502 South had seen a flagman nor a lighted fusee as they approached the rear of No. 5.

Within 5 minutes after the collision, the Elmendorf Air Force Base Air Rescue unit was notified and they immediately dispatched rescue helicopters from Anchorage and Fairbanks to the scene. Sixty-two injured were transported to hospitals in Anchorage of which twenty-two passengers and one crewmember were admitted to the hospital. One of the injured died as a result of his injuries. Many of the more serious injuries were incurred when passengers were thrown into, and their abdominal areas struck, the edges of tables in the dining and lounge cars.

Damages

The rear of No. 5 stopped 76 feet south of the point of impact. All cars were derailed. Car 10, a dome car, was heavily damaged when the underframe buckled. (See Figure 1.) The remaining passenger cars were damaged slightly.

The first four locomotive units of Extra 1502 South derailed. The couplers between the locomotive units were bent. The impact sheared the engine mounting bolts of the first unit and shifted the main generator. The other units also were damaged.

About 500 feet of rail were turned over and torn out as a result of the collision and the derailments.

Costs of damages were estimated as follows:

Passenger train No. 5	\$ 483,660
Extra 1502 South	55,000
Track	<u>20,000</u>
Total	\$ 558,660



Figure 1. Damaged dome car of train No. 5.

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The Accident Site

The single main track, south from Hurricane, is straight until a point 3,121 feet north of the collision. There, a 1° curve to the east extends southward 1,597 feet. The track is then straight for 948 feet, where a 4° curve to the west begins; the curve continues beyond the collision point. For southbound trains, the grade is 1.75 percent descending, from about the beginning of the 1° curve to the collision point. The Anchorage-Fairbanks highway crosses the main track 2,079 feet north of the collision point. (See Figure 2.)

The trains collided in daylight; the weather was clear and the temperature was 70°F.

Method of Operation

The ARR is owned by the U.S. Government and is operated by the Federal Railroad Administration. Trains are operated between Healy and Anchorage by timetable and train orders. There is no automatic block signal system.

Train orders can be issued by the train dispatcher directly to the traincrews by radio. Radio Rule No. 516 prescribes the manner in which train orders must be transmitted:

"Train, engines or equipment must be stopped while copying and repeating train orders and clearance. Operating rules will apply for the transmission of train orders by radio the same as by telephone."

During the investigation, some employees disclosed that they copied train orders while the train was moving if they considered it safe. There is no requirement that the dispatcher determine whether a train is standing before he issues a train order.

The railroad's operating rule No. 91 requires:

"Unless some form of block signal is used, trains in the same direction must keep not less than 10 minutes apart, except in closing up at stations. Lighted fuseses may be used for this purpose. In closing up, the following train must run at restricted speed. Operators when on duty must space trains with train order signal."

This means that following trains should not pass a station where time is shown in the timetable until 10 minutes after the scheduled departure time for the train. (See Appendix A.)

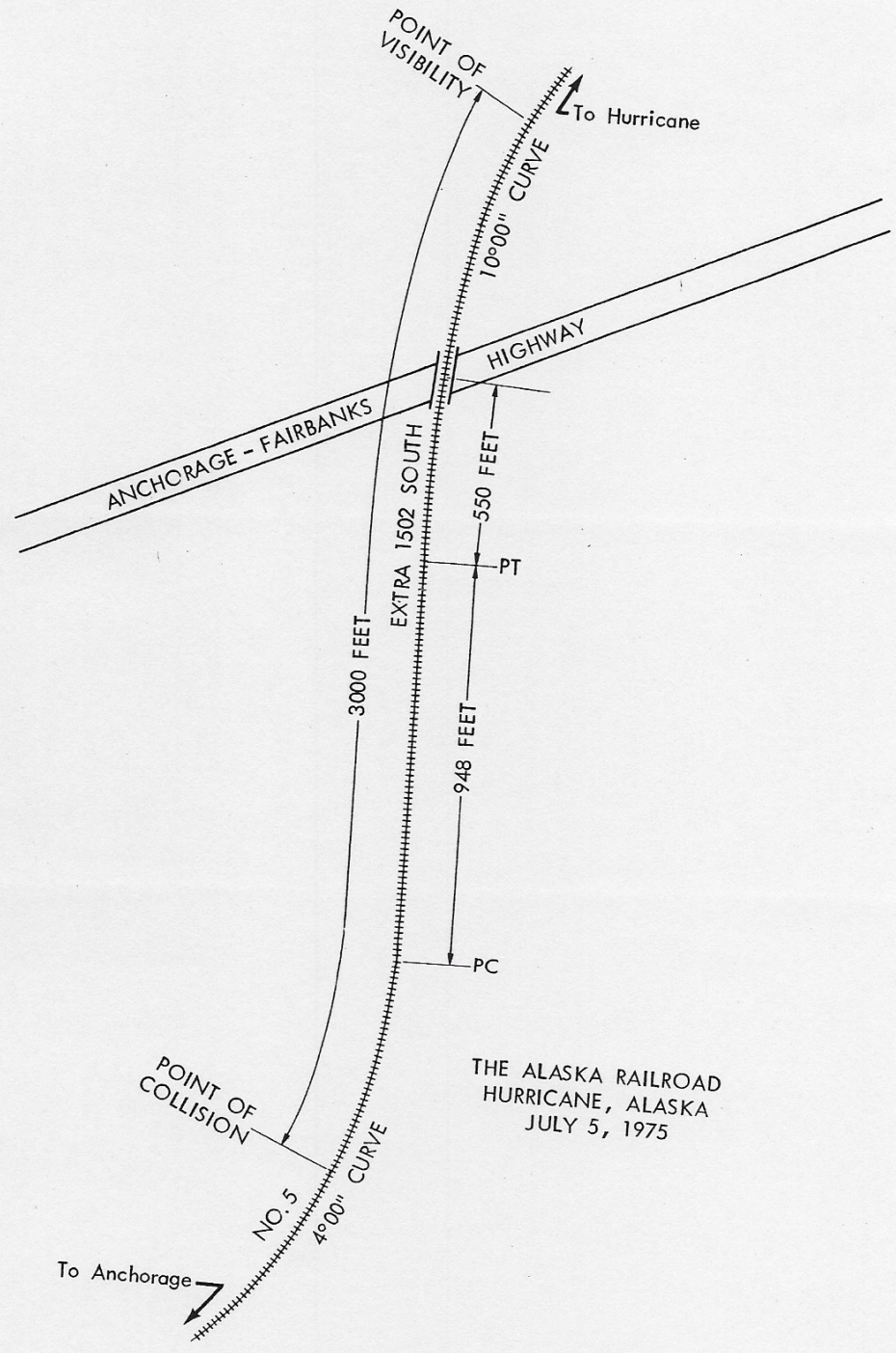


Figure 2. Accident site.

Rule 99, in part, requires:

"When a train is moving under circumstances in which it may be overtaken by another train, the flagman must drop lighted fuses at proper intervals and take such other action as may be necessary to insure full protection.

"When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes and when necessary, in addition, displaying lighted fuses. When recalled and safety of the train permits, he may return, leaving the torpedoes and when conditions require, a lighted fusee.

"When it is known by the engineman that his train will be delayed he must immediately whistle out a flagman. When ready to proceed he will recall the flagman."

In the operation of the trains' braking systems, Rule 440, in part, requires:

"(c) No attempt must be made to release the brakes on a train after an emergency brake application until train has stopped, and time limit as specified in Rule 434 has been complied with."

The maximum authorized speed for trains in the vicinity of the accident was 35 mph.

Crewmembers on passenger trains were permitted to eat meals in the dining car. However, instructions had not been issued as to when and how this would be accomplished; this was left to the discretion of the conductor.

Train Equipment

Passenger Train No. 5 -- No. 5's equipment consisted of two type F-7 diesel-electric locomotive units manufactured by ElectroMotive Division of General Motors Corporation, two baggage cars, five coaches, two dome coaches, a cafe-lounge car, and a dining car. The cars were constructed of steel and equipped with tight-lock couplers. The rear of the last car was equipped with a red oscillating light and marker lights. The oscillating light operated during all train movements.

Extra 1502 South -- The five locomotive units of Extra 1502 South were type F-7, manufactured by the ElectroMotive Division of General Motors Corporation. The first three units had No. 24 RL brake systems and the last two units had No. 6 BLC brake systems. Each unit was provided with clasp brakes which were equipped with high-phosphorous brakeshoes. The independent brake valve of the 24 RL brake system had a bail under the brake handle which, when depressed by a downward movement of the brake handle, released the brakes on the locomotive. This can function with the brake handle in any position. With the independent brake valve, the brakes are released fully when the handle is in its full rearward position and they are applied fully when the handle is in its full forward position.

Speed-recording devices had been installed on the locomotive units. After the accident, the device on the first locomotive unit was calibrated and found to be accurate within 1 mph at 32 mph. The tape showed that Extra 1502 South exceeded the 35-mph limit during the 4 miles preceding the collision and at three points reached 40 mph. Extra 1502 South was moving at 40 mph when the emergency brake application was made just before the collision. The train first began to decelerate 1,500 feet before the collision. A mark on the tape, which could have resulted from the impact, indicates that the speed at that time was about 25 mph.

The remainder of the train consisted of five boxcars, a baggage car, a flatcar, and two cabooses, all of which were empty. Two loaded cars had been set out of the train before the collision. The freight cars were equipped with AB brakes and the baggage car had U-12 BD brakes.

The locomotives, cabooses, and some baggage cars were equipped with permanently installed radios. With these radios, crewmembers could converse with each other, with the crewmembers of other trains, with personnel at the train dispatcher's office, and with personnel at other wayside stations.

The Engineer of Extra 1502 South

The engineer of Extra 1502 South was hired by the Alaska Railroad on July 2, 1957, as a freight station employee. On February 22, 1970, he was transferred to the operating department as a student fireman and on March 31, 1974, he was promoted to engineer. During the period from June 21, 1975, until July 5, 1975, he had worked 2 days as a fireman on passenger trains, 2 days as a fireman on freight trains, 3 days as an engineer on freight trains, and 4 days as an engineer on a switching crew; on 3 days he was not on duty.

Tests

After the accident, tests were performed to determine when No. 5 would have been visible to the crewmembers of Extra 1502 South and to determine how long it would take to stop Extra 1502 South from various speeds.

The visibility tests showed that No. 5 would have become visible to the locomotive crewmembers of Extra 1502 South when their locomotive was about 3,000 feet from No. 5. From that point on, the standing train remained visible.

Four stopping-distance tests were conducted using a train with the same type of equipment as Extra 1502 South. During the first test, the train was operated according to all railroad rules and requirements between Colorado and the accident site. A full service application of the brakes was made at the point where No. 5 first could have been seen by the locomotive crew. With the train moving at a speed of 35 mph, the train was stopped in 1,362 feet. Three additional tests were made to determine stopping distances following an emergency application of the brakes at various speeds. Results of these tests were as follows:

<u>Test No.</u>	<u>Speed mph</u>	<u>Distance to stop feet</u>
1	33	705
2	36	925
3	42	1,215

ANALYSIS

The Accident

As a result of its investigation, the Safety Board concludes that the engineer and brakeman of Extra 1502 South saw the rear of train No. 5 about 3,000 feet in advance of the collision point. The engineer had been preoccupied with copying a train order and allowed Extra 1502 South to pass the point where a service brake application would have stopped the train short of a collision. When he realized what had happened, the engineer made an emergency brake application.

When the engineer moved the independent brake valve forward to the full-application position and then pressed down on the release bail, the emergency brake application on the locomotive units was released and the total braking capability of the train was reduced. Consequently, the braking effort was not sufficient to stop the train, moving at 40 mph on a 1.75-percent descending grade, short of No. 5. However, the stopping-distance tests showed that the train could have been stopped short of a collision had full emergency brakes been applied.

The engineer stated that he believed an application of the independent brake in addition to the emergency brake application would create more braking force. Consequently, he had slammed the independent brake handle forward, but had forgotten that a downward motion of the handle on the release bail would release the emergency application on the locomotive.

Operating Rules and Practices

This accident appears to be the culmination of a series of rule violations and poor practices. If the crews of Extra 1502 South and No. 5 had complied with any one of the following operating rules, the accident would have been avoided.

Rule 91 puts the responsibility for maintaining a 10-minute separation upon the following train. Although the rule allows the use of fuses to maintain separation, it does not require them. If the flagman of No. 5 had left a fusee on the track at Hurricane, Extra 1502 South would have had to stop and wait until the fusee burned out. Even without the fusee, Extra 1502 South was not permitted to leave Hurricane until 3:45 p.m., 10 minutes later than No. 5's scheduled departure time. If the engineer of Extra 1502 South had waited, his train would not have collided with No. 5 at 3:46 p.m. Further, if the engineer had not exceeded the speed limit, more time would have been consumed in traveling the distance between Hurricane and the accident point. There was no safeguard to assure that trains maintained a 10-minute separation in case the following train did not wait 10 minutes. No. 5 should have been required to leave a 10-minute fusee on the track at Hurricane when it departed.

Rule 99 was clear in its requirement that a flagman must protect the train when a train stops as No. 5 did at Hurricane and at the mountain. It was not specific as to when the flagman should have left a lighted fusee; however, it seems that a prudent conductor would require it if he knew that a train was following. Since the engineer did not whistle out a flagman, the question arises whether it was the practice to flag under circumstances such as those at Hurricane and at the mountain stop.

Although the absence of a flagman at the rear of No. 5 at the mountain stop may not have been a causal factor, it is another violation of Rule 99. These violations indicate the need for a complete review of the enforcement policies and practices on the Alaska Railroad. The conductor should have instructed the crewmembers to be sure that when the flagman was eating, the brakeman assumed the flagman's responsibilities. Although it was the conductor's responsibility to see that the train was protected, the experienced brakeman should have flagged without specific instructions to do so since he knew the flagman was eating lunch.

Rule 516 required that the train be stopped if any member of the crew was required to copy a train order. The engineer of Extra 1502 South had heard the conversations between the train dispatcher and the conductor concerning the copying of a train order at Hurricane. He knew the requirements of Rule 516 and even though the conductor did not instruct him to stop at Hurricane to copy the train order, he should have done so.

The front brakeman, who was located in the cab of the locomotive with the engineer, volunteered to copy the train order, but the engineer declined his offer and continued to copy the order. The failure of the engineer to give his full attention to the operation of the train placed the train in a position where an emergency brake application was required to control the train. If the engineer had been giving his full attention to the operation of the train, he could have controlled and stopped Extra 1502 South short of the passenger train.

It could not be determined why the engineer of Extra 1502 South did not stop to copy the train order as required by Rule 516. However, other crewmembers also stated that they had copied train orders while the train was moving when they considered it safe. This raises the question of whether the rule had been enforced.

Rule 440, governing emergency brake applications, required that no attempt be made to release any of the brakes following an emergency application until the train has stopped. The engineer violated this when he applied the independent brake, which released the emergency application.

Air Brake System on Locomotive of Extra 1502 South

The 24 RL locomotive air brake equipment has an independent brake valve which permits the release of the locomotive brakes in all positions of the valve handle. This is different than most systems, which only permit this operation to be performed in one or two settings. There is no valid reason for the release-feature design of the 24 RL independent brake valve, which permits the release of the brakes at times when they should stay applied.

The 24 RL brake equipment has been superseded by the 26-type brake equipment, which does not use this type of independent brake valve. There are, however, a number of locomotives still in service which have 24 RL brake equipment.

CONCLUSIONS

1. The movement of No. 5 was not protected as required by the operating rules at Hurricane or at the mountain stop.
2. The railroad had no procedure to detail the responsibilities of the flagman to another crewmember while the flagman is eating a meal in the diner.
3. The front brakeman, who knew that the flagman had gone forward to the dining car, should have assumed the duties of the flagman.

4. The locomotive crew of Extra 1502 South observed No. 5 in sufficient time to have stopped Extra 1502 South short of the collision.
5. If the crews of Extra 1502 South and of No. 5 had complied with any one of the following operating rules, the accident would have been prevented:
 - a. Rule 516, which required the train to be stopped while crewmembers copied train orders.
 - b. Rule 91, which required the spacing of following trains by 10 minutes.
 - c. Rule 99, which required the display of a lighted fusee on the track if a train slowed down or stopped.
 - d. The maximum speed, which prohibited Extra 1502 South from being operated faster than 35 mph.
6. The Alaska Railroad had not established procedures to insure compliance with Rule 516.
7. The arrangement of the air brake system on the locomotive of Extra 1502 South permitted the engineer inadvertently to release the emergency brake application on the locomotive.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the failure of the engineer of Extra 1502 South to operate the braking system on the locomotive properly and the failures of both traincrews to comply with railroad operating rules.

RECOMMENDATIONS

As a result of this investigation, the National Transportation Safety Board made three recommendations to the Administrator, Federal Railroad Administration. (See Appendix D.)

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BY THE NATIONAL TRANSPORTATION SAFETY BOARD

ly

/s/ WEBSTER B. TODD, JR.
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

February 19, 1976

APPENDIX A

SOUTHWARD		ANCHORAGE-HEALY SUBDIVISION				NORTHWARD	
	First Class 5 DAILY	Capacity of Siding	Rule 6-A Signs	TIME TABLE 95	Mile- post	First Class 6 DAILY	
				May 18, 1975			
				STATIONS			
L	12:40 PM		BJKOP R WXYZ TO	HEALY ②①	358.1	A	4:45 PM
f	12:47	14	P	2.4 GARNER	355.7	f	4:37
s	1:20	50	PXY	7.8 McKINLEY PARK ②①	347.9	s	4:12
f	1:30		P	4.2 LAGOON	343.7	f	3:57
f	1:49	25	P	9.3 CARLO	334.4	f	3:38
f	2:04	100	PY	7.7 WINDY	326.7	f	3:23
s	2:19	36	P	7.2 CANTWELL	319.5	s	3:09
f	2:31		P	7.0 SUMMIT	312.5	f	2:57
f	6 2:45	83	PXY	8.2 BROAD PASS ②	304.3	f	5 2:45
f	3:00	82	P	7.2 COLORADO	297.1	f	2:30
f	3:15	111	P	8.4 HONOLULU	288.7	f	2:15
f	3:35	48	P	7.3 HURRICANE ②	281.4	f	1:55
f	3:50	42	PY	7.6 CHULITNA	273.8	f	1:37
f	4:02	42	P	5.4 CANYON	268.4	f	1:24
f	4:12	100	P	5.2 GOLD CREEK	263.2	f	1:13
f	4:22	29	P	5.5 SHERMAN	257.7	f	1:03
f	4:40	#1-60 #2-50	PWXY	9.2 CURRY ②①	248.5	f	12:46
f	5:03	58	P	12.3 CHASE	236.2	f	12:25
s	5:22	88	P	9.5 TALKEETNA ②①	226.7	s	12:08 PM
f	5:39	80	P	11.4 SUNSHINE	215.3	f	11:50 AM
f	5:48	89	P	6.0 MONTANA	209.3	f	11:42
f	5:58	27	P	7.0 CASWELL	202.3	f	11:32
f	6:10	32	P	8.4 KASHWITNA	193.9	f	11:20
f	6:22	80	PXY	8.2 WILLOW ②	185.7	f	11:09
f	6:39	50	P	10.4 HOUSTON	175.3	f	10:53
f	6:52		P	8.8 PITTMAN	166.5	f	10:41
s	7:02	62	P TO	6.7 WASILLA ②①	159.8	s	10:32
f	7:25	40	PXY	9.1 MATANUSKA	150.7	f	10:10
f	7:40	33	P	9.5 EKLUTNA	141.2	f	9:56
f	7:48	42	P	4.9 BIRCHWOOD	136.3	f	9:48
f	8:07		P	9.7 EAGLE RIVER	126.6	f	9:28
f	8:22	82	PX	7.5 WHITNEY	119.1	f	9:13
A	8:35 PM		BKOP R WXYZ TO	4.8 ANCHORAGE ②①	114.3	L	9:00 AM
	DAILY			(243.8)		DAILY	
	7:55 30:82			Time over Subdivision Average Speed Per Hour		7:45 31:45	

SOUTHWARD TRAINS ARE SUPERIOR TO TRAINS OF THE SAME CLASS IN THE OPPOSITE DIRECTION
(Additional Stops on Signal - See Following Page)

APPENDIX B

EXCERPTS FROM OPERATING RULES

THE ALASKA RAILROAD
RULES AND REGULATIONS
OF THE
OPERATIONS DEPARTMENT

EFFECTIVE: MAY 1, 1966

The rules herein set forth govern The Alaska Railroad. They supersede all previous rules and regulations inconsistent therewith.

Special instructions may be issued by proper authority.

DEFINITIONS

Engine—A unit propelled by any form of energy, or a combination of such units operated from a single control, used in train or yard service.

Train—An engine, or more than one engine, coupled with or without cars, displaying markers.

Regular Train—A train authorized by time-table schedule.

Section—One of two, or more, trains running on the same schedule displaying signals, or for which signals are displayed.

Extra Train—A train not authorized by time-table schedule. It may be designated as:

Extra—for any extra except work extra.

Work Extra—for work train extra.

Superior Train—A train having precedence over another train.

Train of Superior Right—A train given precedence by train order.

Train of Superior Class—A train given precedence by time-table.

Train of Superior Direction—A train given precedence in the direction specified by time-table as between opposing trains of the same class.

Time-Table—The authority for the movement of regular trains subject to the rules. It contains the classified schedules of trains with special instructions relating to the movement of trains.

Schedule—That part of a time-table which prescribes class, direction, number and movement for a regular train.

Sub Division—A portion of the Railroad designated in the time-table by name.

Main Track—A track extending through yards and between stations, upon which trains are operated by time-table or train order, or both, or the use of which is governed by block signals.

Single Track—A main track upon which trains are operated in both directions.

Station—A place designated on the time-table by name.

Siding—A track auxiliary to the main track for meeting or passing trains.

11. A train or engine finding a fusee burning on or near its track must stop and after fusee has burned out, may then proceed.

In territory designated by the Superintendent, trains finding a red fusee burning on or near its tracks may proceed at restricted speed without stopping.

11 (a). Fusees must not be placed near road crossings, bridges, sign boards, nor places where damage from fire may result.

Fusees must not be thrown off in tunnels. If necessary to use in a tunnel, they must be held in the hand, or placed securely in the earth or ballast in such a manner that it would be impossible for fire to be communicated to woodwork within the tunnel.

18 (a). *Headlights - Yard Engines*: Yard engines will display standard headlight to the front and rear by night. The headlight may be extinguished on the end coupled to cars.

Oscillating red light on rear of trains so equipped must be operated continuously day and night while train is on main track. Red light shall be turned on and turned off by trainmen. Display of red light does not relieve conductors or engineers from providing flag protection, or from complying with other rules.

SUPERIORITY OF TRAINS

71. A train is superior to another train by right, class or direction.

Right is conferred by train order; class and direction by time-table.

Right is superior to class or direction. Direction is superior as between trains of the same class as specified in time-table.

72. Trains of the first class are superior to those of the second; trains of the second class are superior to those of the third; and so on.

73. Extra trains are inferior to regular trains and have no superiority by direction except as conferred by rule 88 (b).

APPENDIX B

86. Clearing trains same direction: Unless otherwise provided, an inferior train must clear a first-class train, or a train made superior by a train order, in the same direction, at the time such train is due to leave next station in the rear where time is shown in time-table or train order, except: If the distance between stations is less than three miles, or if the time between stations is less than five minutes, the inferior train must be in clear five minutes or more before the time shown for superior train at station in the rear.

87. Inferior trains must clear opposing superior trains not less than five minutes except at schedule meeting points between trains of the same class where the inferior train must clear the main track before the leaving time of the superior train and failing to clear the main track by the time required by rule must be protected as prescribed by Rule 99. Necessary identification of trains must be made at meeting points, and at passing points.

91. Unless some form of block signal is used, trains in the same direction must keep not less than ten minutes apart, except in closing up at stations. Lighted fusees may be used for this purpose. In closing up, the following train must run at restricted speed. Operators when on duty must space trains with the train order signal.

99. When a train is moving under circumstances in which it may be overtaken by another train, the flagman must drop lighted fusees at proper intervals and take such other action as may be necessary to insure full protection.

When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes and when necessary, in addition, displaying lighted fusees. When recalled and safety of the train permits, he may return, leaving the torpedoes and when conditions require, a lighted fusee.

When it is known by the engineman that his train will be delayed he must immediately whistle out a flagman. When ready to proceed he will recall the flagman.

The front of the train must be protected in the same way when necessary by the forward trainman, or in his absence, by any competent employee.

Conductors and enginemen are responsible for the protection of their trains.

When flagging a train, flagman must spread the flag so that it can be seen by the approaching engineman. Flag should be waved across the track so that it can be distinguished from objects of the same color. Proceed signal must not be given with a fusee or a red flag.

Flagman going out to protect train under requirements of Rule 99 must not have less than six torpedoes and four fusees.

Flagman's equipment will be carried in a rack in cab of steam engines, in a container in cab of diesel engines, and in the baggage compartment of gas or diesel electric motor cars. The required flagging equipment for an engine is one red flag, one white light, 12 torpedoes and 12 fusees. The required flagging equipment for the rear of train is one red flag, one red lantern, 60 fusees and 24 torpedoes.

99 (a). A passenger train flagman, with flagman's equipment, must always appear on the ground at rear of his train immediately after it makes a schedule station stop. By day the red flag must be unfurled.

The flagman must be clothed properly at the different seasons of the year to enable him to perform his full duty in the protection of his train as required by the rules and without having to return to his train for any purpose whatsoever.

99 (b). The flagman must protect his train as prescribed by Rule 99 without waiting for a signal or instructions to do so.

**RULES FOR MOVEMENT BY
TRAIN ORDER**

201. For movements not provided for by time-table, unless otherwise provided, train orders will be issued by authority and over the signature of the Superintendent. They must contain only information or instructions essential to such movement. They must be brief and clear; in the prescribed forms when applicable; and without erasure, alteration or interlineation.

Figures in train orders must not be surrounded by brackets, circles or other characters.

202. Each train order must be given in the same words to all employes or trains addressed.

204. Train orders must be addressed to those who are to execute them, naming the place at which each is to receive his copy. Those for a train must be addressed to the conductor and engineer, and also to anyone who acts as its pilot. The flagman on passenger trains must have a copy of orders and clearance and a copy for each employee addressed must be supplied by the operator.

Orders addressed to operators restricting the movement of trains must be respected by conductors and engineers the same as if addressed to them.

Enginemen and forward brakemen must read train orders, check with each other and have a definite and proper understanding of their requirements. Conductors and trainmen must read train orders, check with each other and have a definite and proper understanding of their requirements.

APPENDIX B

Firemen (when used) and brakemen must call attention of engineers and conductors to any errors or omissions in, or failure to observe train orders or to clear the time of superior trains.

204 (a). Each engineer must receive copies of all train orders, but only the engine by which the train is designated need be referred to in train orders if not equipped with indicators.

220. Train orders once in effect continue so until fulfilled, superseded or annulled. Any part of an order may be either superseded or annulled.

Orders held by or issued for any part of an order relating to a regular train become void when such train loses both right and schedule as prescribed by Rules 4 and 82, or is annulled.

FORMS OF TRAIN ORDERS

B

Directing a Train to Pass or Run Ahead

- (1) *No 1 pass No 3 at Willow
No 3 take siding at Willow*
- (2) *Extra 1510 North pass No 6 at Broad Pass
No 6 take siding at Broad Pass*

Both trains will run according to rule to the designated point and there arrange for the rear train to pass promptly. The order must specify which train will take siding.

When an inferior train receives an order to pass a superior train, authority is conferred to run ahead of the superior train from the designated point.

- (3) *Extra 28 North run ahead of No 6 Anchorage to Matanuska.*

The first named train will run ahead of the second named train between the points designated.

Under examples (1), (2) and (3) when a train is delayed after receiving authority to pass or to run ahead of another train, it will allow the following train to pass.

Train dispatcher will be notified at once by the inferior train, when practicable, and by the superior train at the first open office. When the superior train is allowed to pass, because of delay to inferior train, the order must be considered fulfilled.

Form B orders do not relieve the preceding train from protecting as prescribed by Rule 99.

RAILROAD RADIO RULES — GENERAL

508. Employees shall identify the radio station from which they are speaking by prefacing with proper identification, for example:

- "Caboose of Number 23 to engine."
- "Yard Engine 7107 to Anchorage Yard Office."
- "Caboose of Number 23 calling Dispatcher."
- "Engine 1078 to caboose of Number 22."

516. Train, engines or equipment must be stopped while copying and repeating train orders and clearance. Operating rules will apply for the transmission of train orders by radio the same as by telephone.

517. These rules do not modify or supersede any rule of the Rules and Regulations of the Operating Department, or Special Instructions Supplementary Thereto.

AIR BRAKE RULES AND REGULATIONS

Governing

Train Handling, Operation and Tests of Air and Air Signal Apparatus

Emergency Application:

440. When the brakes apply automatically from the train at an emergency rate of reduction, as shown by the brake pipe pressure falling rapidly to zero, the automatic brake valve must be placed in lap position to prevent loss of main reservoir pressure, and left in that position until the train stops. Use sand until train stops. Use the independent brake to reduce brake cylinder pressure on the engine to prevent sliding wheels. Use the engine brake as heavily as possible without sliding drivers, for the last 100 feet with a freight train to avoid a run-out of any slack as the train stops.

APPENDIX B

When stop is completed (and PC switch recovered on a diesel engine), allow sufficient air to pass through the brake pipe to enable the trainmen to locate the cause.

(a) When the brakes apply automatically from the train at an emergency rate of reduction, the throttle (if open) should be gradually closed. If speed of train increases considerably with throttle open, it may be due to train parting near head end. Under this condition the throttle should not be closed while there is danger of rear portion of train colliding with front portion.

(b) When brakes apply at an emergency rate of reduction on a train assisted by engines in the rear, the assisting engineman should immediately close throttle, apply sand and not reduce engine brake cylinder pressure unless there is a possibility of wheels sliding.

(c) No attempt must be made to release the brakes on a train after an emergency brake application until train has stopped, and time limit as specified in Rule 434 has been complied with.

(d) When a train is stopped with an emergency application of the brakes whether from engine or train, or at a service rate of reduction from the train, the engineman will not move the engine until signals are communicated to him by a member of the crew. The train will not proceed without a signal from the rear in event communication is lost.

APPENDIX C

THE ALASKA RAILROAD
TRANSPORTATION

Anchorage, Alaska
March 19, 1973

OPERATING CIRCULAR NO. 9

To: All Concerned
From: Operations Officer
Subject: Observation Stops - Trains No. 5 and 6

In order to permit tourists to view Mt. McKinley and take pictures on days of clear visibility, when passenger interest warrants, Trains 5 and 6 will stop in the vicinity of Mile 224 and 279. Stops are not to exceed five minutes.

Conductors will announce these stops in advance, giving location of Mt. McKinley so passengers may prepare to take pictures.

Passengers are not to be allowed to leave the train during these stops.

/s/ _____
Operations Officer

Distribution B, D & E

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

APPENDIX D

ISSUED:

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Forwarded to:

Honorable Asaph H. Hall
Administrator
Federal Railroad Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-76-10 through R-76-12

On July 5, 1975, an Alaska Railroad freight train, Extra 1502 South, collided with the rear of passenger train No. 5, which had stopped just south of Hurricane, Alaska, to permit the passengers to view Mt. McKinley. All cars of the passenger train and the first four locomotive units of the freight train were derailed. Sixty-two persons were injured and one of the injured subsequently died.

No. 5 had stopped at Hurricane, 2.2 miles north of the point of the collision, and had departed at 3:41 p.m., 6 minutes later than its scheduled departure time of 3:35 p.m. The crew did not throw off lighted fuseses to protect the rear of the train as it departed from Hurricane and moved southward to the mountain-viewing stop. The train had stopped for about 1 minute at the mountain stop and had just started to move southward when the collision occurred at 3:46 p.m.

The crew of Extra 1502 South had been instructed by the train dispatcher to copy a train order by radio at Hurricane. Even though the operating rules required the train to be stopped when a crewmember copied a train order, Extra 1502 South was not stopped at Hurricane.

The engineer of Extra 1502 South was copying the train order when No. 5 first became visible to the crewmembers on the locomotive, about 3,000 feet north of No. 5. The speed of Extra 1502 South at this time was 40 mph, which was in excess of the maximum permitted speed of 35 mph. The engineer applied the brakes slightly but, the speed was not reduced. The train continued to move southward to about 1,500 feet north of No. 5, where the engineer applied the brakes in emergency. Then he immediately placed the independent brake valve in the full-application position and depressed the release bail. This action released the emergency application of the

APPENDIX D

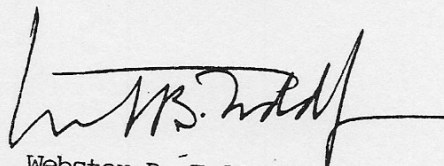
brakes on the five locomotive units. The lead locomotive unit of Extra 1502 South had a 24 RL braking system which permits an automatic brake application on the locomotive to be released by depressing the independent brake valve handle in any position.

This accident appears to be the culmination of a series of rule violations and poor practices. There is no doubt that the engineer and front brakeman of Extra 1502 South saw No. 5 in sufficient time to have stopped their train by regular means, despite its improper speed, but the preoccupation of the engineer with copying the train order permitted the train to move to a point where an emergency application was required to stop the train short of the collision. The emergency application still should have stopped the train short of the collision, but the improper release of the locomotive emergency brake negated this possibility.

Therefore, the National Transportation Safety Board recommends that the Federal Railroad Administration;

1. Institute procedures on the Alaska Railroad to insure consistent compliance with operating rules. (R-76-10) (Class II, Priority Followup)
2. Revise the Alaska Railroad operating rules so that they explicitly state the actions required to provide safe operation. (R-76-11) (Class II, Priority Followup)
3. Require all railroads to modify the 24 RL independent brake valves to eliminate future unwanted release of locomotive brakes. (R-76-12) (Class II, Priority Followup)

TODD, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.



By: Webster B. Todd, Jr.
Chairman

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

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