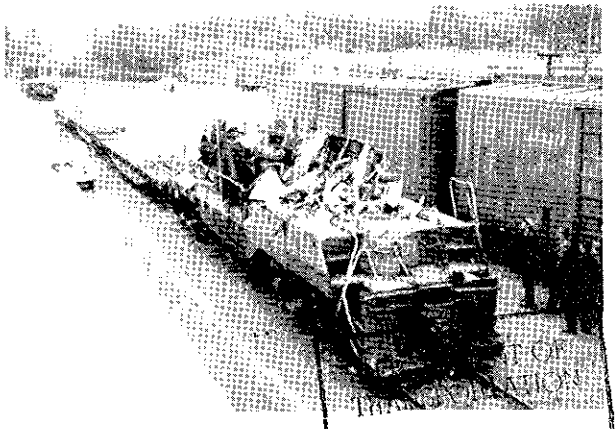
RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4152



GREAT NORTHERN RAILWAY COMPANY
(BURLINGTON NORTHERN, INC.)

MARYSVILLE, WASHINGTON

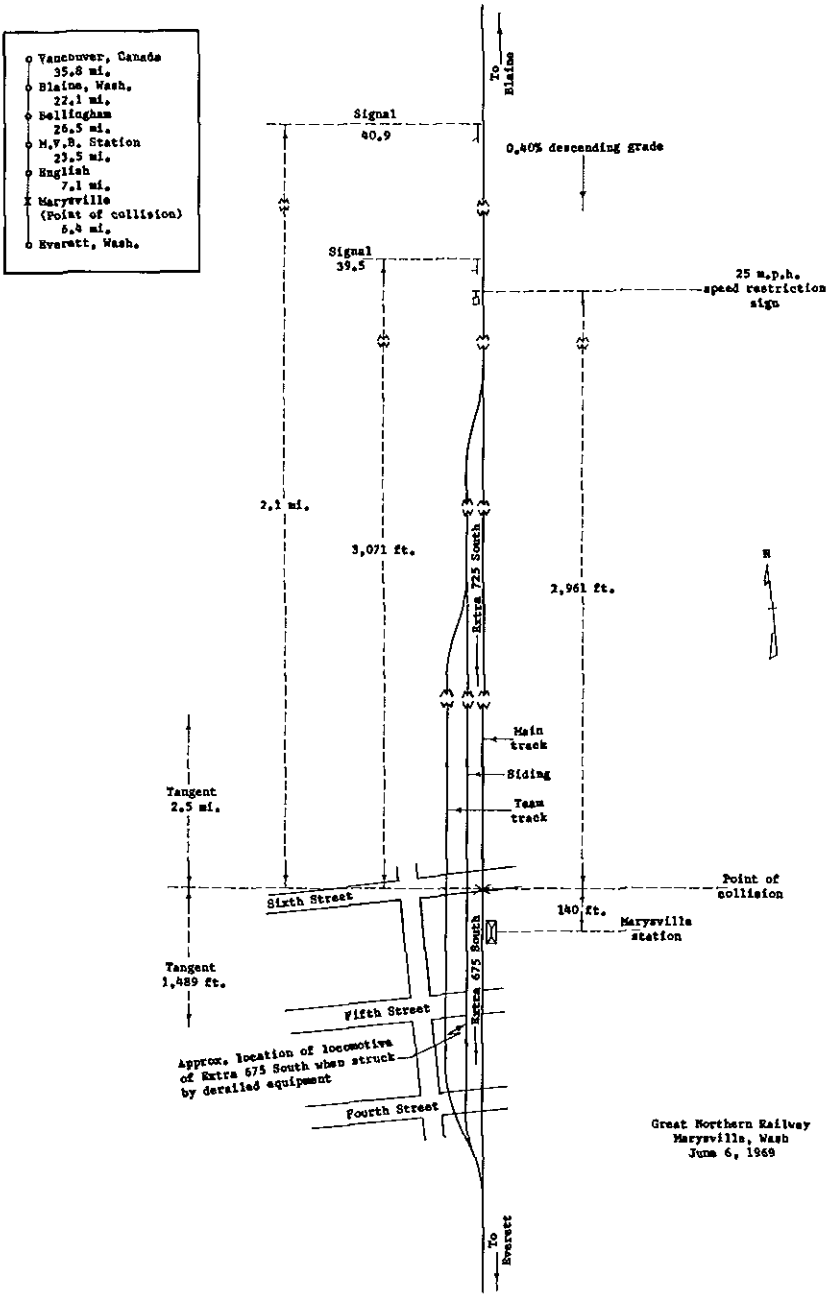
JUNE 6, 1969

Federal Railroad Administration
Bureau of Railroad Safety
Washington, D C 20591

Summary

DATE:	June 6, 1969	
RAILROAD:	Great Northern	
LOCATION:	Marysville, Wash	
ACCIDENT TYPE:	Rear-end collision	
TRAINS INVOLVED	Freight	Freight
TRAIN NUMBERS:	Extra 675 South	Extra 725 South
LOCOMOTIVE NUMBERS:	675	725
CONSISTS:	3 cars, caboose	35 cars, caboose
SPEEDS:	Standing	63 m p h
OPERATION:	Timetable, train orders, automatic block-signal system	
TRACK:	Single; tangent; 0 40% descending grade southward	
WEATHER:	Clear	
TIME:	3:44 a m	
CASUALTIES:	2 killed; 2 injured	
CAUSE:	Engineer of following train lapsing into unconsciousness and failure of front brakeman to maintain a lookout ahead, resulting in following train passing a stop signal and colliding with train standing on the main track	
COVER PHOTO:	Locomotive of Extra 675 South	

PLATE NO 1


Vancouver, Canada
35.8 mi.
Blaine, Wash.
22.1 mi.
Bellingham
26.5 mi.
M.V.B. Station
23.5 mi.
English
7.1 mi.
Marysville
(Point of collision)
5.8 mi.
Everett, Wash.
To Blaine
Signal
40.9
0.40% descending grade
Signal
39.5
25 m.p.h.
speed restriction
sign
2.1 mi.
3,071 ft.
2,961 ft.
Extra 725 South
N
Main
track
Siding
Team
track
Tangent
2.5 mi.
Point of
collision
Sixth Street
140 ft.
Marysville
station
Extra 675 South
Tangent
1,489 ft.
Fifth Street
Approx. location of locomotive
of Extra 675 South when struck
by derailed equipment
Fourth Street
Great Northern Railway
Marysville, Wash
June 6, 1969
To
Everett

DEPARTMENT OF TRANSPORTATION

FEDERAL RAILROAD ADMINISTRATION

BUREAU OF RAILROAD SAFETY

RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4152

GREAT NORTHERN RAILWAY COMPANY

JUNE 6, 1969

Synopsis

On June 6, 1969, a rear-end collision occurred between two Great Northern Railway freight trains at Marysville, Washington It resulted in death to two, and in injury to two, members of the train crews

Cause

The collision was caused by the engineer of the following train lapsing into unconsciousness and failure of the front brakeman to maintain a lookout ahead, resulting in the following train passing a stop-signal and colliding with the train standing on the main track

Location of Accident and Method of Operation

The accident occurred on that part of the railroad extending southward from Blaine to Everett, Wash , a distance of 85 6 miles In that area the railroad is a single-track line over which trains operate by timetable, train orders, and an automatic block-signal system

At Marysville, 79 2 miles south of Blaine, a siding and a team track parallel the main track on the west, as shown in Plate No 1

The collision occurred on the main track, 140 feet north of the Marysville station

Several city streets cross the railroad at grade within the Marysville city limits. Because of this, the maximum authorized speed for all trains moving through Marysville is restricted to 25 m p h

A 25 m p.h speed restriction sign for southbound trains is adjacent to the main track, 2961 feet north of the collision point

Main Track

From the north, the main track is tangent approximately 2 5 miles to the collision point and 1489 feet southward The grade for southbound trains in that area is 0 40% descending

Time and Weather

The collision took place at 3:44 a m , under clear weather conditions

Signals

Automatic signals 40 9 and 39 5, governing southbound movements on the main track, are 2 1 miles and 3071 feet north of the collision point, respectively They are of the upper-quadrant semaphore type and are approach lighted The applicable signal aspects, indications and names are as follows:

Signal	Aspect	Indication	Name
40.9	Yellow	Proceed prepared to stop before any part of train *** passes the next signal Trains exceeding 40 MPH must immediately reduce to that speed	Approach
39 5	Red	Stop before any part of train *** passes the signal then proceed at restricted speed through entire block	Stop and Proceed

When the block of signal 40 9 is unoccupied and the block of signal 39 5 is occupied, signals 40.9 and 39 5 display Approach and Stop-and-Proceed aspects, respectively, for an approaching southbound train

Authorized Speeds

The maximum authorized speed for freight trains between Blaine and Everett is 60 m p.h It is restricted, however, to 25 m p h in the speed-restriction zone at Marysville

Carrier's Operating Rules

34 All members of the crew in cab of engine must *** communicate to each other by its name the indication of each signal affecting the movement of their train *** as soon as it becomes visible ***

804B When conditions or signals require that the train be stopped or speed of train be reduced and the engineer or conductor fails to take proper action to do so, or should the engineer become incapacitated, other members of the crew must take immediate action to stop train, using emergency brake valve if necessary

Train Equipment

The locomotive and caboose of Extra 725 South, the following train involved in the accident, were equipped with radio-telephones The control compartment of the locomotive was equipped with an Alertor safety control system This is an electronic system which includes a built-in antenna in the engineer's seat It is so designed that any motion by the engineer will be detected by the antenna. A timing circuit set for 20 seconds is actuated each time the seat antenna detects motion If the antenna detects no motion within that 20-second period, an audible and visual indicator calls the engineer's attention to this fact If the seat antenna detects no motion within the following 10-second period, a relay contact opens, causing an automatic application of the train brakes

The Alertor safety control system of the locomotive of Extra 725 South was not functioning the day of the accident, due to the system having been cut out This matter will be explored later in our report

Circumstances Prior to Accident

Train Extra 675 South

Extra 675 South, a southbound local freight train, left M.V.B. Station, 48 6 miles south of Blaine, at 12:15 a m the day of the accident Shortly before 3:20 a m , the train, consisting of 1 road-switcher type diesel-electric unit, 3 cars and a caboose, passed signals 40 9 and 39 5, and entered the 25 m p h speed-restriction zone at Marysville A few minutes later, it stopped on the main track in the block of signal 39 5, with the rear end 3071 feet south of that signal and 140 feet north of the Marysville station The locomotive then moved to the siding and the team track for switching operations, leaving its train on the main track without any crew member providing flag protection against following trains The carrier's rules did not require such protection, due to the train being stopped in automatic block-signal territory

Train Extra 725 South

Extra 725 South, a southbound freight train, left Vancouver, B C , Canada at 7:05 p m the day before the accident After entering the United States and stopping at Blaine, Wash , where the crew members dined while a customs inspection was made, the train resumed its trip southward

Extra 725 South, consisting of 1 road-switcher type diesel-electric unit, 35 cars and a caboose, passed English, 7 1 miles north of Marysville, about 3:35 a m Soon afterward, it neared signals 40.9 and 39 5 The engineer and front brakeman were in the control compartment at the rear of the locomotive The conductor, flagman, and swing brakeman were in the caboose The train brakes had been tested and had functioned properly when used en route

The Accident

Extra 675 South

About 20 minutes after leaving its train on the main track at Marysville, the locomotive of Extra 675 South completed switching operations at the north end of the team track and began to push three empty flat cars slowly southward on the siding The engineer and fireman were in the control compartment at the north, or rear, end of the locomotive The conductor, flagman, and front brakeman were on the leading flat car in the direction of the movement.

After passing its train and the Marysville station, the locomotive began to push the three flat cars over the Fifth Street grade crossing located just south of the station A few seconds later, as the locomotive was about to move clear of the crossing, the portion of its train standing on the main track was struck from the rear by Extra 725 South, at 3:44 a m Derailed equipment of the latter train then struck the locomotive pushing the three flat cars, killing its engineer and fireman

According to some of their statements, the conductor, flagman, and front brakeman of Extra 675 South were unaware of anything being wrong before the collision on the main track Their other statements, however, indicate that they had seen Extra 725 South approaching Marysville and had thought it would stop short of their train In either event, the conductor, flagman, and front brakeman jumped from the leading flat car immediately before or at the time of the collision on the main track, and escaped injury

Extra 725 South

This train was moving on an ascending grade at 35 m p.h as indicated by the speed-recording tape, as it neared English, 7 1 miles north of Marysville It then entered the descending grade on which the collision occurred, and passed English while moving about 45 m p.h and increasing speed

The engineer stated that he had not noticed any fumes in the locomotive control compartment while en route from Vancouver, and that he had been alert and feeling well until shortly after his train passed English At that time, according to his statements, he "blacked out " Although the investigation revealed information indicating otherwise, the engineer said he vaguely recalled having seen a "yellow block" (signal 40 9) in the distance before becoming fully

unconscious, and having moved the throttle from Run 8 to Run 5 or 6 position for controlling the speed properly in the block of signal 40 9 He further said that he could not remember anything else leading up to the accident, except for a vague recollection that he saw the train ahead and applied his brakes in emergency a moment or two before the collision

The speed tape shows Extra 725 South continued to increase speed after the engineer allegedly lapsed into unconsciousness It was moving about 60 m p h when it passed signal 40.9, which indicated Approach The train had increased speed to 62 m p h when it passed signal 39 5, which indicated Stop-and-Proceed, and entered the 25 m p h speed-restriction zone at Marysville Approximately 30 seconds after passing signal 39 5 and entering the speed-restriction zone, Extra 725 South collided with the train standing on the main track while moving at 63 m p h

The front brakeman of Extra 725 South stated that because of a nauseous feeling caused by fumes in the locomotive control compartment, he rode with his head out the window on the left side of the compartment and looked back at the cars as his train moved on the tangent track in approach to signals 40 9 and 39 5, and the collision point In essence, the front brakeman's other statements are that (a) he and the engineer had called the indications of some signals to each other while en route from Vancouver (b) he did not see signals 40 9 and 39 5 or hear the engineer call the indications of those signals (c) he had no knowledge of the engineer's condition nearing Marysville (d) he had taken no exception to the excessive speed at which his train moved after entering the Marysville speed-restriction zone, and (e) he was unaware of anything wrong until just before the collision, when he looked ahead and saw the caboose of Extra 675 South standing on the main track a short distance ahead

The conductor, flagman and swing brakeman of Extra 725 South were in the caboose as their train approached Marysville The swing brakeman was holding a radio conversation with a yardmaster located at a point south of Marysville According to their statements, none of the crew members on the caboose (a) saw either signal 40 9 or 39 5 (b) took any exception to the excessive speed at which his train entered and moved in the 25 m p h speed-restriction zone at Marysville or (c) was aware of anything wrong before the brakes of his train applied in emergency before or at the time of the collision

Damages

Extra 675 South

The caboose of this train was derailed and destroyed The impact propelled the three cars ahead of the caboose 1135 feet southward on the main track, without derailing or damaging them The locomotive was struck by derailed equipment of Extra 725 South, while moving slowly southward on the siding at the south edge of the Fifth Street crossing It derailed, stopping upright on and in line with the siding structure about 80 feet

south of the crossing The engine hood was torn off and the engine was somewhat damaged The control compartment was crushed, as a result of a derailed gondola car stopping on top of it The photo on the cover page shows the extent of damage to the locomotive

Extra 725 South

The locomotive and first 20 cars of this train were derailed The locomotive overturned onto its left side It stopped at a 40-degree angle to, and with one end across, the main track about 450 feet south of the collision point The derailed cars stopped in various positions on or near the structures of the main track, siding and team track, as shown in Plates No 2 and No 3

Of the derailed equipment, the locomotive and 11 cars were destroyed; 6 cars heavily damaged, and 3 cars slightly damaged

Marysville Station

The southern half of the station was struck by derailed equipment and was virtually destroyed The station was unoccupied

Damage Cost

According to the carrier's estimate, the cost of damages to train equipment and track structures was $319,810

Casualties

Extra 675 South

The engineer was killed as a result of multiple compound skull fractures The fireman was also killed, by crushing injuries to his head and chest The engineer and fireman were found near their locomotive, on the ground between the siding and team track

Extra 725 South

The front brakeman suffered a concussion and internal injuries The engineer sustained bruises, and lacerations of the right arm

Post-Accident Examinations and Tests

Signals

Signals 40 9 and 39 5 were tested after the accident and were found to be functioning properly

View

Tests revealed that signal 40 9 is not visible from a southbound locomotive in the area where the engineer of

PLATE NO 2

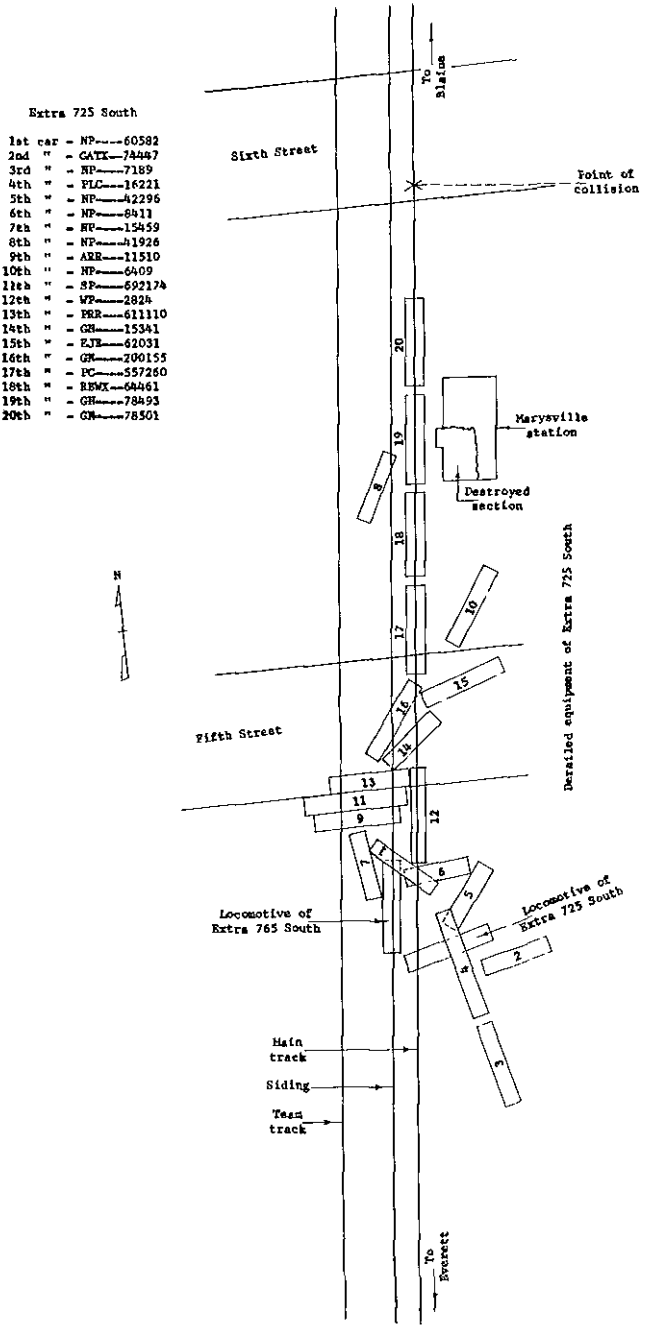
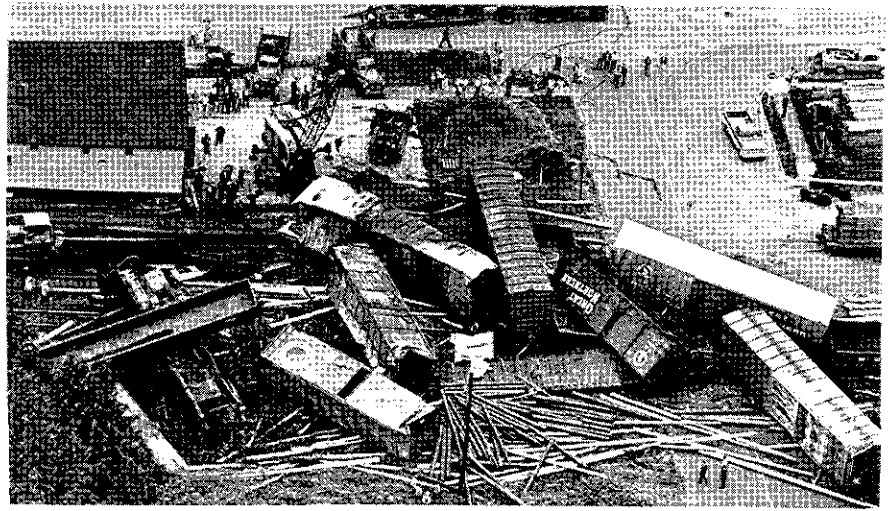

Extra 725 South
1st car - NP----60582
2nd " - GATX---74487
3rd " - NP----7189
4th " - FLC---16221
5th " - NP----42296
6th " - NP----8411
7th " - NP----15459
8th " - NP----41926
9th " - ARR---11510
10th " - NP----6409
11th " - SP----692174
12th " - WP----2824
13th " - PRR---611110
14th " - GN----15341
15th " - EJE---62031
16th " - GN----200155
17th " - PC----557260
18th " - REMX--64461
19th " - GN----78493
20th " - GN----78501
To Blaine
Sixth Street
Point of collision
Marysville station
Destroyed section
Derailed equipment of Extra 725 South
Fifth Street
Locomotive of Extra 765 South
Locomotive of Extra 725 South
Main track
Siding
Team track
To Everett
N

PLATE NO. 3



Extra 725 South approached from right. Locomotive of that train is under gondola car at left. Locomotive of Extra 675 South is under wreckage at center.

Extra 725 South allegedly lapsed into unconsciousness, due to track curvature and trees alongside the railroad The locomotive must reach a point more than two miles farther southward before the signal comes into view, indicating that the engineer's vague recollection of having seen a "yellow block" (signal 40 9) before becoming completely unconscious was erroneous

Locomotive of Extra 725 South

Examination of this locomotive soon after the accident found the throttle in Run 8 position, indicating that the engineer's vague recollection of having moved the throttle to Run 5 or 6 position before becoming completely unconscious was also erroneous The reverser of the locomotive was found in forward position; the independent brake valve in release position; the emergency brake valve on the left side of the control compartment in closed position; the cutout cock of the Alertor safety control system in cutout position; a broken seal attached to the aforesaid cutout cock, and a plastic covered foam-rubber seat pad belonging to the engineer The automatic brake valve was found in emergency position, indicating that the engineer may have moved the brake valve to that position immediately before the collision, as alleged

Alertor Safety Control System

This system was removed from the locomotive of Extra 725 South, installed in the control compartment of a similar locomotive, and tested The system functioned properly after it was cut-in on the test locomotive It was also tested with the engineer's foam-rubber seat pad in use In some of the latter tests, the pad interfered with the seat antenna's ability to detect normal motion of the employee at the controls In those cases, the employee was required to move in an unusual manner to nullify the Alertor system action, i e prevent the system from applying the brakes automatically

Hours of Service

Extra 675 South

All the crew members of this train had been on duty 14 hours 44 minutes at the time of the accident, after having been off duty 9 hours 15 minutes

Extra 725 South

All the crew members of this train had been on duty 10 hours 14 minutes at the time of the accident, after having been off duty 11 hours 20 minutes at Vancouver

Best information available indicates all the crew members had motel rooms for their layover at Vancouver, and had slept there before reporting on duty for the accident trip The engineer stated he had eight hours sleep before reporting for duty, and had felt fully rested at that time

Engineer and Front Brakeman of Extra 725 South

The front brakeman, age 22, was first employed by the carrier in May 1969, after passing physical and rules examinations His record was clear.

The engineer, age 66, was first employed by the carrier as a fireman in 1945, and was promoted to engineer in November 1961 after passing a mechanical examination His service record indicates he last passed a physical examination by the carrier on July 8, 1968, and an operating rules examination on January 22, 1969. It further indicates he was subjected to disciplinary action by the carrier in (a) September 1964, for responsibility in connection with a side collision involving a cut of cars in a yard, and (b) March 1969, for failure to stop a train before passing a stop-signal

Post-Accident Medical Examinations

The front brakeman of Extra 725 South refused to undergo a blood test after the accident

Examination of the engineer of Extra 725 South by the carrier's physician revealed that his heart and neurological conditions were normal, and that his blood was negative for alcohol and sugar content

In connection with his physical condition, the engineer stated he could not recall ever having "blacked out" before the day of the accident, but there was a possibility he had done so without knowing it He further stated that some time shortly before undergoing the carrier's medical examination on July 8, 1968, he went to a private physician for a complete examination, indicating that he had felt some concern about his physical condition According to the engineer, the examination by his personal doctor revealed that he had a minor diabetic condition As a result, he was given a prescription calling for him to take one Orinase tablet every day He said that he followed the prescription faithfully, and had taken an Orinase tablet before reporting on duty for the accident trip

Apparently the carrier's examination on July 8, 1968, detected no diabetic condition of the engineer He stated that he did not inform the carrier's physician about his recent examination by a private doctor; the diabetic condition disclosed by that examination, or the medication he was taking daily

Condition of Alertor Safety Control System Before Accident Trip

The engineer of Extra 725 South operated locomotive 725 on his northward trip to Vancouver He stated that the Alertor system was inoperative during that trip, for some undetermined reason, and that he found it was still inoperative after the locomotive left the Vancouver enginehouse for its return trip southward A bulletin of the

carrier requires an engineer finding an Alertor safety control system defective to report such finding by wire to the division superintendent from the first available point of communication The engineer said he did not make the aforesaid required wire report after finding the Alertor system to be inoperative on the northward trip to Vancouver, or after leaving the Vancouver enginehouse for the southward trip He further said that after completing the northward trip, he did not submit a locomotive inspection report showing the Alertor system was inoperative and in need of repair, as required under such circumstances

According to the carrier's enginehouse records, the Alertor system of locomotive 725 was cut in, sealed, tested and found to be functioning properly before the locomotive was dispatched for its northward trip to Vancouver The records further indicate the Alertor system was tested again at the Vancouver enginehouse and found to be functioning properly, before the locomotive was dispatched for its southward, or accident, trip

After the accident, the engineer of Extra 725 South was charged with manslaughter for the deaths of the engineer and fireman of Extra 675 South A trial by jury in the Snohomish County Superior Court of the State of Washington found him guilty of this charge The conviction was based on criminal negligence, for cutting out the Alertor safety control system of his locomotive

Conclusions

Extra 675 South

1 The rear portion of this train was standing on the main track at Marysville in accordance with applicable rules and regulations of the carrier, under protection afforded by the Approach and Stop-and-Proceed indications of signals 40 9 and 39 5, respectively None of the crew members was providing flag protection against following trains, due to such protection not being required under the carrier's rules

Extra 725 South

1 Considering the speed (62 m p h) at which this train entered the 25 m p h speed-restriction zone at Marysville, and the relatively short distance (2961 feet) between the southward speed-restriction sign and the collision point, the crew members on the caboose probably could not have stopped their train short of a collision had they taken action to apply the brakes in emergency after the train entered the speed-restriction zone at excessive speed

2 The aforesaid crew members lack of concern for compliance with the speed restriction imposed on trains at Marysville apparently contributed to the severity of the accident Had they felt proper concern when the train neared and entered the speed-restriction zone without reducing speed, and promptly attempted to establish radio communica-

tion with the engineer, the crew members in the caboose might have alerted themselves to the necessity of applying the train brakes in emergency If they had then taken such action, it is possible the train would have decreased speed materially before the collision, lessening the accident consequences with the possibility of the enginemen of Extra 675 South escaping fatal injuries

3 A significant causal factor in the accident was failure of the front brakeman of Extra 725 South to maintain a lookout ahead as his train approached signals 40 9 and 39 5, and to call the indications of those signals to the engineer as required by the carrier's rules Considering that the engineer noticed no fumes in the locomotive control compartment; that if the front brakeman was feeling nauseous as alleged, he could have refreshed himself just as well by looking ahead from his open side window as by looking back; that the train was moving on tangent track in approach to signals 40 9 and 39 5, and the collision point; that the front brakeman merely had to look ahead occasionally to see the indications of those signals; that calling the indications of those signals to the engineer required no great effort by the front brakeman, whether or not he was feeling nauseous, and that safety of a train movement requires a diligent lookout ahead be maintained, the reason given by the front brakeman for not maintaining a lookout ahead and seeing the indications of signal 40.9 and 39 5 lacks validity. Consequently, it is concluded that for some unjustifiable reason the front brakeman neglected to maintain a lookout ahead while approaching signals 40 9 and 39 5 Had he maintained such a lookout, he would have seen the engineer was not complying with the indications of those signals and realized the necessity of taking action to stop the train, as required by the rules Thus, he might have averted the accident

4 Extra 725 South left Vancouver with the Alertor safety control system of the locomotive inoperative, due to being cutout From all indications, this system was functioning properly when the engineer took charge of the locomotive at the Vancouver enginehouse, as evidenced by enginehouse employee work reports; the lack of any wire or locomotive inspection report by the engineer that the system was malfunctioning or inoperative, and by tests conducted after the accident Hence, it appears that the engineer cutout the Alertor system some time after leaving the Vancouver enginehouse, possibly due to his privately-owned rubber seat pad interfering with the ability of the system's seat antenna to detect motion, and to the engineer wanting to prevent the system from causing undesired brake applications resulting from the seat antenna's inability to detect motion.

The inoperative Alertor safety control system was a significant contributing factor in the accident, as the engineer evidently was motionless in his seat for a considerable period of time while his train approached the collision point. Had the Alertor system not been cutout,

it would have detected the engineer's lack of motion in approach to signal 40 9 and stopped the train by applying its brakes automatically, averting the accident

5 Since the investigation revealed nothing in contradiction to the statements of the engineer of Extra 725 South that he had eight hours sleep before going on duty at Vancouver and had been alert until shortly after his train passed English, there is no support for an assumption that he fell asleep at the controls Thus, it is concluded he "blacked out," as claimed, resulting in his inability to operate his train in accordance with the indications of signals 40 9 and 39 5, and to avoid the collision The incapacitation of the engineer was the primary cause of the accident

The investigation revealed that about 12 months before the accident a medical examination by a private phsyician found the engineer had a minor diabetic condition It further revealed the carrier's medical examination conducted about 11 months before the accident apparently did not find that the engineer had a diabetic condition, and the engineer did not inform the carrier's physician about the results of the previous medical examination As a result of the examination by his personal physician, the engineer was given a prescription calling for him to take one Orinase tablet daily He followed the prescription faithfully, taking one Orinase tablet the afternoon of the day he reported on duty for the accident trip Under the circumstances, it would appear that the engineer became incapacitated while approaching the collision point because of adverse affects from the medication he was taking for control of his diabetic condition

That the consumption of Orinase can cause physical incapacitation is evidenced by a Federal Aviation Administration regulation which prohibits pilots on active duty from taking such medication. It is further evidenced by our Accident Investigation Report No 4142, concerning a collision involving a passenger train engineer who had a diabetic condition and was taking Orinase tablets for medication In that case, the engineer suddenly lapsed into unconsciousness after entering a siding to meet an opposing train, resulting in his train failing to stop short of the other end of the siding, and colliding with the opposing train

6 The circumstances involved in this accident serve well to illustrate the necessity of all crew members assuming and sharing equal responsibility for the safety of their train, to prevent an accident in the event one of the crew members fails to take proper action under conditions requiring the train to stop or reduce speed

Recommendations*

It is recommended that:

1 All line-haul railroad carriers prohibit engineers taking Orinase for medication, or any other medication sus-

ceptible to producing serious side effects, from service on locomotives engaged in line-haul operations

2 All railroad carriers having locomotives equipped with Alertor safety control systems or similar systems, issue instructions prohibiting enginemens' use of privately-owned seat cushions that might affect proper functioning of the safety control systems. Such instructions would be conducive to eliminating the possibility of an engineman cutting out an Alertor system being adversely affected by his privately-owned seat cushion, due to believing the system is in defective condition

3 The Burlington Northern, Inc take measures to ensure that supervisory officials are informed of every case in which a locomotive arrives at an enginehouse with a broken seal of a cutout cock or similar valve, so that such officials may exercise appropriate supervision over the use of sealed cutout cocks or valves

4 The railroad industry undertake a comprehensive study of the serious safety problem caused by neglect or failure of enginemen to operate trains in accordance with signal indications, speed restrictions, train orders, operating rules, etc , and by failure of other crew members to take appropriate action for the safety of their trains when enginemen neglect or fail to do so.

Dated at Washington, D C , this 2nd day of July 1970
By the Federal Railroad Administration

Mac E. Rogers, Director
Bureau of Railroad Safety

NOTE: *The Federal Railroad Administration has no jurisdiction over railroad operating rules; track structures; bridges; rail-highway grade crossing protection; track clearances; consist of train crews; qualifications or physical condition of railroad employees, running and draft gear on cars, or the construction of cars except those appurtenances within jurisdiction of the Safety Appliance Act and the Power Brake Law of 1958