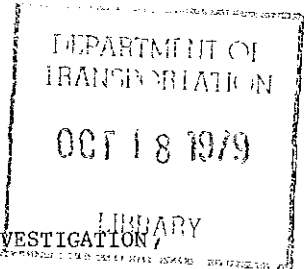


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4172



RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4172,

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KANSAS CITY SOUTHERN LINES

ZWOLLE, LA.

SEPTEMBER 23, 1970

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FEDERAL RAILROAD ADMINISTRATION

113 2113  
BUREAU OF RAILROAD SAFETY,  
Washington, D C 20590

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NO.  
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Summary

DATE: September 23, 1970

RAILROAD: Kansas City Southern

LOCATION: Zvolle, La

ACCIDENT TYPE: Rear-end collision

TRAINS INVOLVED: Freight Freight

TRAIN NUMBERS: Extra 1 South Extra 50 South

LOCOMOTIVE NUMBERS: 1, 202 50A, 32A, 118,  
2

CONSISTS: 15 cars, caboose 52 cars, ca-  
boose

SPEEDS: Standing 27 m p h

OPERATION: Timetable, train  
orders

TRACK: Single; 2°33' curve;  
0 88% ascending  
grade southward

WEATHER: Clear

TIME: 8:25 p m

CASUALTIES: 2 killed

CAUSE: Failure of engineer  
to control speed of  
following train as  
required by a train  
order

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RAILROAD ACCIDENT INVESTIGATION  
REPORT NO. 4172

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KANSAS CITY SOUTHERN LINES  
SEPTEMBER 23, 1970

Synopsis

On September 23, 1970, a rear-end collision occurred between two freight trains on the Kansas City Southern Lines near Zwolle, La. It resulted in death to two crew members of the following train

Cause

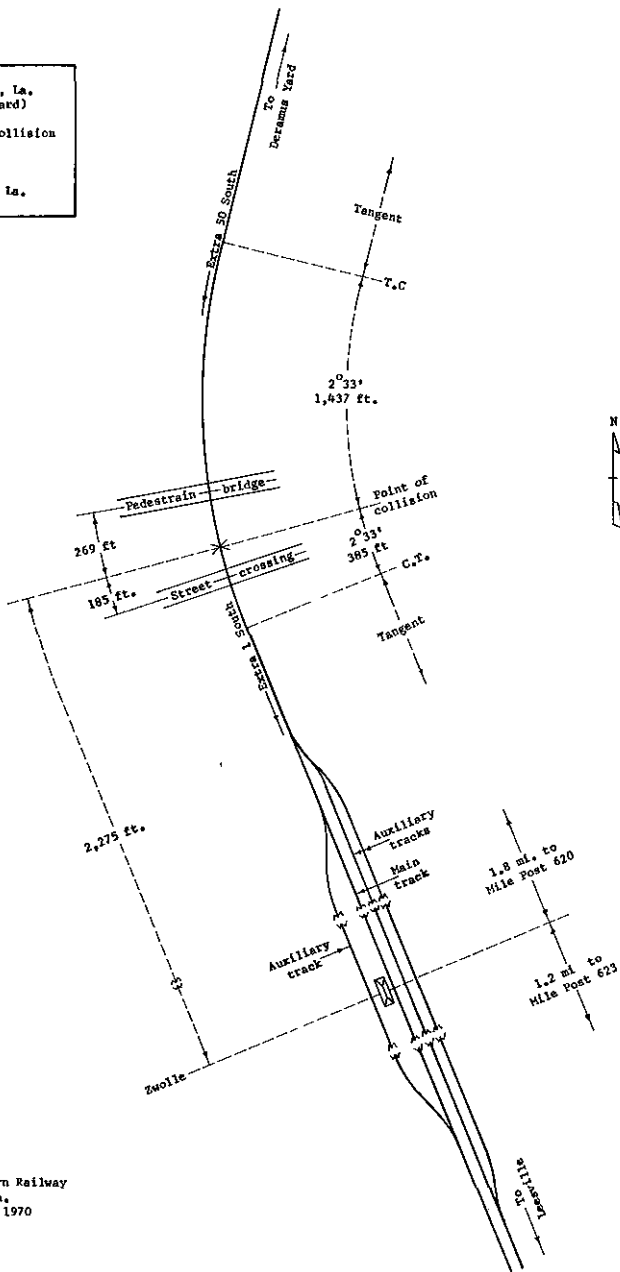
The accident was caused by failure of the engineer to control the speed of the following train as required by a train order

Location and Method of Operation

The accident occurred on that part of the Kansas City Southern Railway extending southward from Deramus Yard, Shreveport, to Leesville, La., a distance of 115.1 miles. In the accident area this is a single-track line over which trains operate by timetable and train orders. There is no block-signal system in use.

The collision occurred on the main track, 68.1 miles south of Deramus Yard and 2275 feet north of the station at Zwolle.

o	Shreveport, La. (Deramus Yard)	58.1 mi.
x	Point of collision	0.4 mi.
o	Zwolle	46.6 mi.
o	Leesville, La.	



Kansas City Southern Railway  
Zwolle, La.  
September 23, 1970

Mile Posts 620 and 623 are 1.8 miles north and 1.2 miles south of the Zwolle station, respectively. Auxiliary tracks are along both sides of the main track in the station area, as indicated in Plate No. 1.

A pedestrian bridge spans the main track 269 feet north of the collision point. A street crosses the main track at grade 185 feet south of the collision point.

#### Track

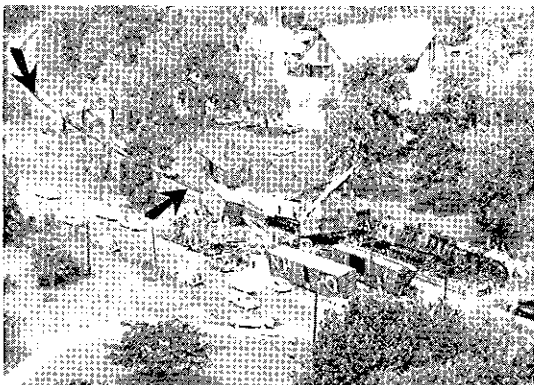
From the north on the main track there are, successively, a long tangent, a 2°33' curve to the left 1437 feet to the collision point and 385 feet southward, and a long tangent. In this area the average grade for southbound trains is 0.88% ascending.

#### Authorized Train Speed

The maximum authorized speed for freight trains in the territory involved is 35 m p h. It is restricted to 15 m p h, however, over street crossings at Zwolle.

#### Sight Distance

Because of track curvature, trees bordering the track structure, and supports for the pedestrian bridge, the maximum range of vision between a caboose standing at the collision point and an approaching southbound train is restricted to approximately 350 feet (see photo below).



Arrows shown direction of trains involved and the approximate point of collision. Photo taken during wreck clearing operations.

Time and Weather

The collision took place at 8:25 p m , under clear weather conditions

Carrier's Operating Rules

Restricted Speed - Proceed prepared to stop short of train, engine, obstruction or switch not properly lined

99 Flagging Rule \*\*\*

When a train stops on a main track 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 red fuseses \*\*\*

Louisiana Public Service Commission Order No. 1623

This order is dated October 21, 1913 In essence, it is a State regulation providing that when a train stops or is delayed in Louisiana, under circumstances in which it may be overtaken by another train, "the flagman must go back immediately with stop signals a sufficient distance to insure full protection " It defines the term "sufficient distance" and prescribes the procedure to be followed by the flagman in the performance of his flagging duties

According to a representative of the Louisiana Public Service Commission, Order No. 1623 is still in effect and, with respect to circumstances involved in the Zwolle accident, cannot be disregarded by issuance of a dispatcher's train order

Instruction No. 162 of the carrier's Special Instructions associated with the timetable is a verbatim extract of portions of Order No. 1623

Train Order No. 507

Beginning July 7, 1970, copies of train order No 507 were delivered to crew members of southbound trains at Deramus Yard, including the crew members of both trains involved in the collision at Zwolle on September 23, 1970 The order read in part as follows:

All trains run at restricted speed  
 between MP 589 and MP 594  
 MP 620 and MP 623  
 MP 632 and MP 635  
 Expecting to find train switching on  
 main track and cars left on main track  
 unprotected by flag

Under the provisions of this order, all trains were required to run at Restricted Speed, prepared to stop short of a train, obstruction or switch not properly lined, between the Mile Post limits shown. Crews of trains stopped on the main track within those limits were relieved by the carrier of the necessity of providing flag protection against following trains

#### Circumstances Prior to Accident

##### Train Extra 1 South

This southbound local freight train left Deramus Yard at 9:20 a m and switched at several points en route southward. Before departure from Deramus Yard, the crew members received copies of several train orders, including order No 507

About 6:20 p m., Extra 1 South entered the territory between Mile Posts 620 and 623, and stopped on the main track at the north end of Zwolle for switching operations. While it engaged in those operations, the locomotive left the train standing on the main track between MP 621 and MP 622. The rear end was stopped 2275 feet north of the station and on a 2°33' restricted-view curve.

Shortly before 8:25 p m., the locomotive completed the work required at the north end of Zwolle and returned to the main track, to move the train to the south end of Zwolle for further switching operations. When the train, consisting of 2 diesel-electric units, 15 cars and a caboose, was reassembled on the main track at the north end of Zwolle, the front brakeman began to couple the air hoses between the locomotive and first car. At that time, the flagman was on the platform at the rear of the first diesel-electric unit. The conductor, engineer, and fireman were in the control compartment of this unit. Because of its location between Mile Posts 620 and 623, the train was standing on the main track without flag protection against following trains, as authorized by train order No 507.

##### Train Extra 50 South

Extra 50 South, a southbound freight train consisting of 4 diesel-electric units, 52 cars and a caboose, left Deramus Yard at 6:10 p m. the day of the accident, after having had the prescribed brake test. Before departure, the crew members received copies of several train orders, including order No 507.

Approximately 2 hours 15 minutes after leaving Deramus Yard, Extra 50 South approached MP 620 and Zwolle. The engineer and front brakeman were in the control compartment at the front of the first diesel-electric unit, which was of the car-body type. The conductor and flagman were in the caboose.

### The Accident

#### Extra 1 South

About 8:25 p m , while this train was standing on the main track at the north end of Zwolle and the front brakeman was engaged in coupling the air hoses between the locomotive and first car, crew members in the control compartment of the first locomotive unit saw the headlight of Extra 50 South come into view on that portion of the 2°33' curve to the rear of their train. About the same time, they heard one blast from the horn of the approaching train; saw sparks flying from under the cars, indicating the brakes of the approaching train were applied, and realized Extra 50 South would be unable to stop short of their train. Hearing the one blast from the horn of Extra 50 South, the front brakeman stepped quickly from between the locomotive and first car. Immediately afterward, Extra 1 South was struck from the rear by Extra 50 South.

#### Extra 50 South

This train approached Zwolle while moving at 34 m.p h., as indicated by analysis of the speed tape of the second locomotive unit after calibration of the speed-recording device. Both the conductor and flagman, the only surviving crew members, said the brakes had been used occasionally en route and had functioned effectively.

Statements of the surviving crew members and analysis of the speed tape indicate the engineer initiated a service brake application nearing the territory extending from MP 620 to MP 623, where the train was required by train order No 507 to run at Restricted Speed, prepared to find a train or cars occupying the main track without flag protection. The brakes were released soon after the train passed MP 620, when the speed had been reduced to 30 m.p h. The engineer apparently initiated another service brake application soon afterward, slowly reducing the speed as the train moved in the vicinity of MP 621 and entered the 2°33' curve to the left on which the collision occurred.

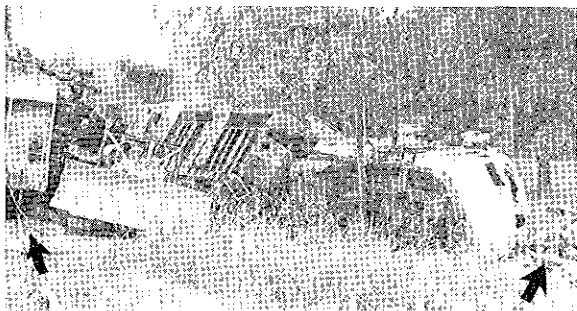
As Extra 50 South moved southward on the restricted-view curve under a service brake application and at a speed of approximately 28 m p.h., the caboose of the preceding train came into the engineer's and front brakeman's view at a distance of about 350 feet. They apparently saw the caboose seconds later, and the engineer apparently sounded one blast of the locomotive horn at that time. Presumably, he also moved the automatic brake valve to emergency position, although this valve was found in release position after the accident. There is some evidence, however, to indicate the front brakeman initiated the emergency brake application by opening the emergency brake valve in the locomotive control compartment. In any event, a few seconds after the preceding train came into view Extra 50 South struck its rear end while moving at a speed of 27 m p.h. The speed tape of Extra 50 South shows no sharp deceleration in speed before the impact.



### Damages

#### Extra 1 South

The last car and the caboose of this train were derailed. The car remained upright on and in line with the track structure. It was damaged considerably. The caboose was destroyed. Its wreckage stopped about 160 feet south and 40 feet east of the collision point, immediately in front of the derailed locomotive of Extra 50 South. Its fuel tank ruptured, resulting in escaping propane catching fire.



Arrows point to last car and wreckage of caboose of Extra 1 South. First locomotive unit of Extra 50 South shown with front end against caboose wreckage.

#### Extra 50 South

This train stopped with its front end about 160 feet south of the collision point. All four locomotive units and the first five cars were derailed. The first diesel-electric locomotive unit overturned onto its left side and stopped with the front end against the wreckage of the caboose of the preceding train. The other locomotive units and the derailed cars stopped in various positions on or near the track structure. Fuel tanks of the locomotive units were ruptured, and escaping oil was ignited by the propane fire originating from the caboose of the preceding train. This resulted in flames spreading over a considerable area of wreckage.

The first three locomotive units were destroyed. The fourth unit and four cars were heavily damaged, and the remaining derailed car was slightly damaged.

#### Damage Cost

The cost of damages to the track structure and equipment of both trains was \$447,100, according to the carrier's estimate.

### Casualties

The engineer and front brakeman of Extra 50 South were killed.

### Post-Accident Examination

Examination of the control compartment of the first locomotive unit of Extra 50 South revealed that the left windshield was broken; all three tubular-frame seats were torn from their floor connections; water cooler torn from its normal position; door on right side of control compartment torn from its frame; high voltage cabinet door torn from its frame; aluminum sun visors torn off, and the control stand sheared off at the base. The reverser was found in forward position; brake pipe cutout cock in "In" position; rotair valve in "Freight" position; automatic brake valve in release position; independent brake valve in release position, and emergency brake valve in open position. There was no fire damage in this control compartment

### Train Crews' Hours of Service

#### Extra 1 South

All the crew members of this train had been continuously on duty 12 hours 35 minutes at the time of the accident. The conductor had been previously off duty 24 hours. The other crew members had been off duty between eight and nine hours.

#### Extra 50 South

All the crew members had been on duty 4 hours 10 minutes at the time of the accident, after having been off duty 16 hours or more.

### Engineer and Front Brakeman of Extra 50 South

#### Engineer

This employee, age 60, was first employed by the carrier as a fireman in June 1942, and was promoted to engineer in March 1956. His service record indicates that on January 21, 1964, he was discharged from service for a violation of Rule 93 (yard-limit rule) resulting in his train colliding with a cut of cars standing on the main track. He was reinstated on April 1, 1964.

#### Front Brakeman

This employee, age 46, was first employed by the carrier as a brakeman in April 1945, and was promoted to conductor on June 1, 1969. His service record indicates he was suspended from service for five days in 1960 for his responsibility in connection with a side collision in one of the carrier's yards.

### Information Relative to Train Order No. 507

Extra 1 South was a southbound train operating on a regular local freight run. Beginning July 7, 1970, the train dispatchers began to issue train order No 507 to trains on the local freight run and to other southbound trains leaving Deramus Yard. The purpose of the order

was to expedite movement of the local freight train by relieving its flagman of the necessity of providing flag protection against following trains, as prescribed by Rule 99 and Special Instruction 162, when his train stopped for switching operations at points between the Mile Posts shown in the order. By being relieved of the requirement to provide flag protection, the flagman was enabled to assist in switching operations performed between the aforesaid Mile Posts. Thus, movement of the local freight train over the road was expedited.

The investigation revealed that although it apparently did not fully conform with any of the forms of train orders shown in the carrier's operating rules, train crews, railroad officials and train dispatchers understood that order No. 507 relieved crews of trains stopped on the main track within the Mile-Post limits shown of the necessity of providing flag protection against following trains, and that all trains were required to run at Restricted Speed, prepared to stop short of a train or obstruction between the specified Mile-Post limits. Considering the order had been issued regularly over a lengthy period of time, one may assume that Extra 50 South engineer's and front brakeman's understanding of the order was similar to the railroad employees and officials mentioned above. In this connection, statements made by the conductor of Extra 1 South indicate that on at least one previous occasion when the local freight train was stopped without flag protection between Mile Posts shown in the order, the engineer of Extra 50 South was operating a following train which approached the local freight train at Restricted Speed and stopped short of the latter train as required by the order.

#### Analysis

At the time of the accident, Extra 1 South was standing on the main track between Mile Posts 620 and 623 without flag protection against following southbound trains, as authorized by train order No. 507.

Under the provisions of order No. 507 and the rules, Extra 50 South was required to run at Restricted Speed between Mile Posts 620 and 623, expecting to find a train or cars occupying the main track without flag protection and prepared to stop short of such train or cars. In addition, a speed restriction required Extra 50 South not to exceed 15 m p h over a street crossing located 185 feet south of the collision point.

The investigation revealed the engineer of Extra 50 South initiated a service application of the brakes in approach to MP 620 and released the brake application shortly after the train passed that mile post, when its speed had been reduced to 30 m p h. He initiated another service application of the brakes while moving in the vicinity of Mile Post 621, and this began to reduce the speed slowly as the train moved onto the north end of the restricted-view curve on which the accident occurred. As the train approached the south end of the curve, while moving at 28 m p h

with the brakes applied, the engineer apparently began to sound the prescribed whistle signal for the street crossing located 185 feet south of the collision point but discontinued this after sounding one blast, due to seeing the caboose of Extra 1 South come into view at a distance of about 350 feet. An emergency brake application was promptly initiated, but there was insufficient braking distance for this brake application to become fully effective, resulting in Extra 50 South colliding with the preceding train while moving at 27 m.p.h. Under the circumstances, it is evident the accident was caused by the engineer not controlling the speed of Extra 50 South between Mile Posts 620 and 623 as required by train order No. 507. It is further evident that he was not controlling the speed as required in approach to the street crossing in the vicinity of the collision point.

According to their statements, the carrier's train dispatchers consider it within their prerogative to supersede the carrier's operating rule No. 99 and Special Instruction No. 126 by issuing a train order that permits a train in the State of Louisiana to occupy the main track without protection against following trains. The question of whether such a train order is in compliance with Order No. 1623 of the Louisiana Public Service Commission involves a matter not within our jurisdiction.

#### Findings

1 Copies of train order No. 507 were issued to crew members of both trains involved in the accident. The order authorized Extra 1 South to occupy the main track between Mile Posts 620 and 623 without flag protection against following trains. It required Extra 50 South to run between those Mile Posts at Restricted Speed, expecting to find the main track occupied and prepared to stop short of a train or cars.

2 At the time of the accident, Extra 1 South was standing on the main track between Mile Posts 620 and 623 without flag protection against following trains, as authorized by train order No. 507.

3 Due to its excessive speed within the limits of Mile Post 620 and 623, Extra 50 South was unable to stop short of Extra 1 South, as required, when the caboose of the latter train came into view on the restricted-view curve.

4 The collision was caused by failure of the engineer to control the speed of Extra 50 South as required by train order No. 507. The reason for this failure could not be determined.

Dated at Washington, D. C., this 14th  
day of September 1971  
By the Federal Railroad Administration

Mac E. Rogers, Director  
Bureau of Railroad Safety