INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT OF THE DIRECTOR BUREAU OF SAFETY

ACCIDENT ON THE CHICAGO, BURLINGTON & QUINCY RAILROAD

NAPIER, MO

OCTOBER 2, 1939

INVESTIGATION NO 2386

UNITED STATES
GOVERNMENT PRINTING OFFICE
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SUMMARY

Inv–2386

Railroad	Chicago, Burlington & Quincy	
Date	October 2, 1939	
Location	Napier, Mo	
Kind of accident	Head-end collision	
Trains involved	Passenger	Freight
Train numbers	21	92
Engine numbers	Motor car 9900	Engine 4973
Consist	Four cars	Two cars
Speed	45–50 miles per hour	Standing
Operation	Timetable, train orders, and automatic block system, train orders and manual block system for movements against current of traffic	
Track	Tangent, 0.1 percent descending for northward movements	
Weather	Clear	
Time	4:25 p. m.	
Casualties	2 killed and 38 injured	
Cause	Junction switch opened without authority from operator in charge, diverting train to an occupied track	

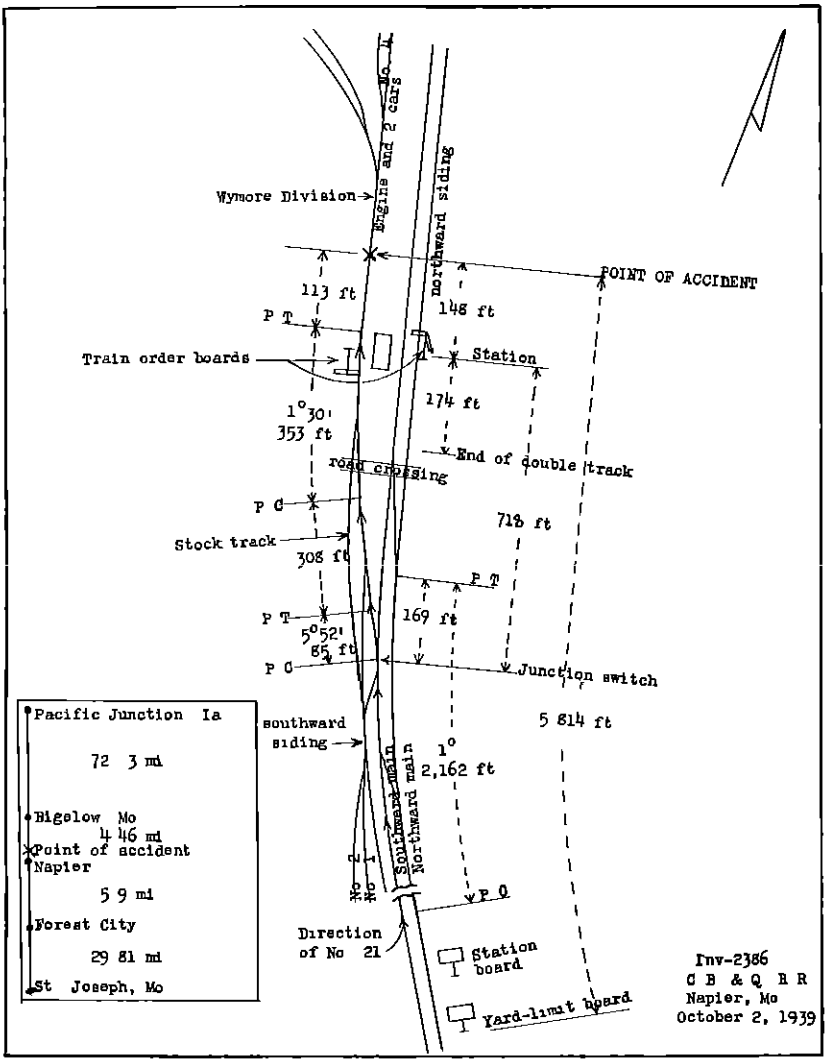

FIGURE 1 — Track layout in vicinity of the point of accident

DECEMBER 21, 1939

TO THE COMMISSION

On October 2, 1939, there was a head-end collision between a passenger train and an engine and 2 cars, comprising the front portion of a freight train, on the Chicago, Burlington & Quincy Railroad at Napier, Mo., which resulted in the death of 2 employees and the injury of 25 passengers, 5 railway mail clerks, 1 employee off duty, 1 porter, 3 dining-car employees, and 3 train-service employees

LOCATION AND METHOD OF OPERATION

The accident occurred on that part of the St Joseph Division designated as the St Joseph to Pacific Junction Subdivision which extends between St Joseph Freight Yards, Missouri, and Pacific Junction, Iowa, a distance of 114.03 miles Between St Joseph and Napier it is a double-track line over which trains are operated by timetable, train orders and an automatic block system, trains moving against the current of traffic are operated by train orders and a manual block system The end of double track is located 174 feet south of the station from which point single track continues in a northerly direction and lies east of the station, trains are operated over the single track between Napier and Pacific Junction by timetable, train orders, and a manual block system A junction switch, known as No 1 and located 718 feet south of the station, connects the southward track to the main track of the Wymore Division, which extends in a northwesterly direction and lies west of the station Yard tracks are situated both north and south of the station and are connected by the main track of the Wymore Division The passenger train involved was being operated on the southward track against the current of traffic The accident occurred on the main track of the Wymore Division at a point 148 feet north of the station Approaching this point from the south, beginning at the yard-limit board, there is a tangent 2,954 feet in length, which is followed by a 1° curve to the right 2,162 feet in length, the junction switch is located on this curve at a point 169 feet from its north end and its normal position is for main-track movements on the St Joseph Division Entry to the Wymore Division is made through a No 11 turnout to the left, and from the point of frog, 85 feet beyond, there is a tangent a distance of 308 feet, which is followed in succession by a 1°30′ curve to the right 353 feet in length and a tangent 113 feet to the point of accident The No 11 turnout has a 5°52′ curvature to the left, at the point of switch the superelevation is 2⅜ inches and this superelevation extends on the west rail of the turnout to the point of frog, and it then decreases from 2⅜ inches to level within a distance of 110 feet, this results in the superelevation being

on the inside of the curve, and all trains using this switch are required to run at restricted speed The southward siding connects with the Wymore Division main track at a point 211 feet north of the junction switch, the normal position of the switch connecting these tracks is for movements to the siding The north switch of track 4, which parallels the single-track line on the west, is located about 4,383 feet north of the station The grade for north-bound trains is 0 1 percent descending

The junction switch stand was of the Bethlehem 53-A type and was located on the east side of the southward track, it was equipped with an oil lamp and a single-vane target, the target, however, was not designed for this stand and it had been cut off on its lower edge to avoid fouling the casting The target was 11 inches above the tops of the ties

The south yard-limit board is located 5,814 feet south of the point of accident

Rule 14 (q) of the operating rules provides that when running against the current of traffic, one long and one short blast of the engine whistle will be sounded when approaching stations, curves, or other points where view may be obscured

Other rules of the operating department provide as follows

Rule 98 Trains must approach the end of two or more tracks, junctions, railroad crossings at grade and drawbridges, prepared to stop, unless the switches are properly lined, signals indicate proceed, and track is clear Where required by law, trains must stop

Rule D–R

* * * * * * *

A train authorized to move against the current of traffic must proceed through yard limits at restricted speed

Restricted speed is defined as Proceed prepared to stop short of train, obstruction or anything that may require the speed of a train to be reduced

D–251 On portions of the road so specified on the time table, trains will run with the current of traffic by block signals whose indications will supersede time table superiority

D–252 The movement of trains will be supervised by the Superintendent who will issue instructions to signalmen when required

D–254 Except as affected by Rules D–251 and D–252, all Block Signal Rules and Train Rules remain in force

Time-table instructions provide as follows

Where Rules D–251, D–252 and D–254 are in effect, freight trains stopped by train order signal at stations where sidings are located on or near schedule of first class trains, will clear the main track at once unless otherwise advised by signalman Conductors must advise promptly when clear of main track, and receive permission from signalman before he can again return to main track

Operators when on duty will handle switches at stations, and for movements, as follows * * * Napier junction switch and crossover * *

The office at Napier is open continuously

The maximum authorized speed for north-bound Zephyr-type motor trains is 50 miles per hour through the turn-out at Napier

The weather was clear at the time of the accident, which occurred at 4 25 p m

DESCRIPTION

No 92, a south-bound second-class freight train, consisting of 26 cars and a caboose, hauled by engine 4973, in charge of Conductor Niday and Engineman Cooper, left Bigelow, 4 46 miles north of Napier, at 3 45 p m, and arrived at Napier at 4 p m, according to the train sheet, 3½ hours late This train entered track 4 and a separation was made behind the second car, the engine and first two cars proceeded to the south yard where one car was set out and another car picked up The engine and two cars then backed to the water crane, 222 feet north of the station, on the Wymore Division main track, and had just stopped to take water when the engine was struck by No 21

No 21, a north-bound passenger motor train, designated as the Pioneer Zephyr, consisted of four articulated streamlined units, and was in charge of Conductor Crouch and Engineman Hughes The first unit, No 9900, consisted of a power, a railway post office, and a storage mail compartment, the second unit was a baggage and express car, the third unit was a combination kitchenette, diner and coach, the fourth unit was a coach and parlor car This equipment was of high tensile, stainless steel side-truss construction There was a 600 hp Diesel-electric-drive engine in the power compartment This train departed from St Joseph, 35 67 miles south of Napier, at 3 55 p m, according to the train sheet, 2 minutes late At Forest City, 5 9 miles south of Napier, the crew received clearance Form A and a copy of train order No 34, Form 19, reading

> No 21 motor car 9900 has right over opposing trains on southward track Forest City to Napier

The train crossed over to the southward track, leaving Forest City at 4 20 p m, 2 minutes late, and approached the yard-limit board at Napier at a speed of about 75 miles per hour, it entered the open junction-switch leading to the Wymore Division and while moving at a speed estimated to have been about 45 or 50 miles per hour collided with engine 4973 at a point 859 feet beyond this switch

Engine 4973 and the two cars were moved backward 128 feet by the impact, the driving wheels were derailed to the west and the rear end of the tender was knocked off center, the front end of the engine was considerably damaged The front truck of the first unit of No 21 was derailed and stopped crosswise of the track, 10 feet from the

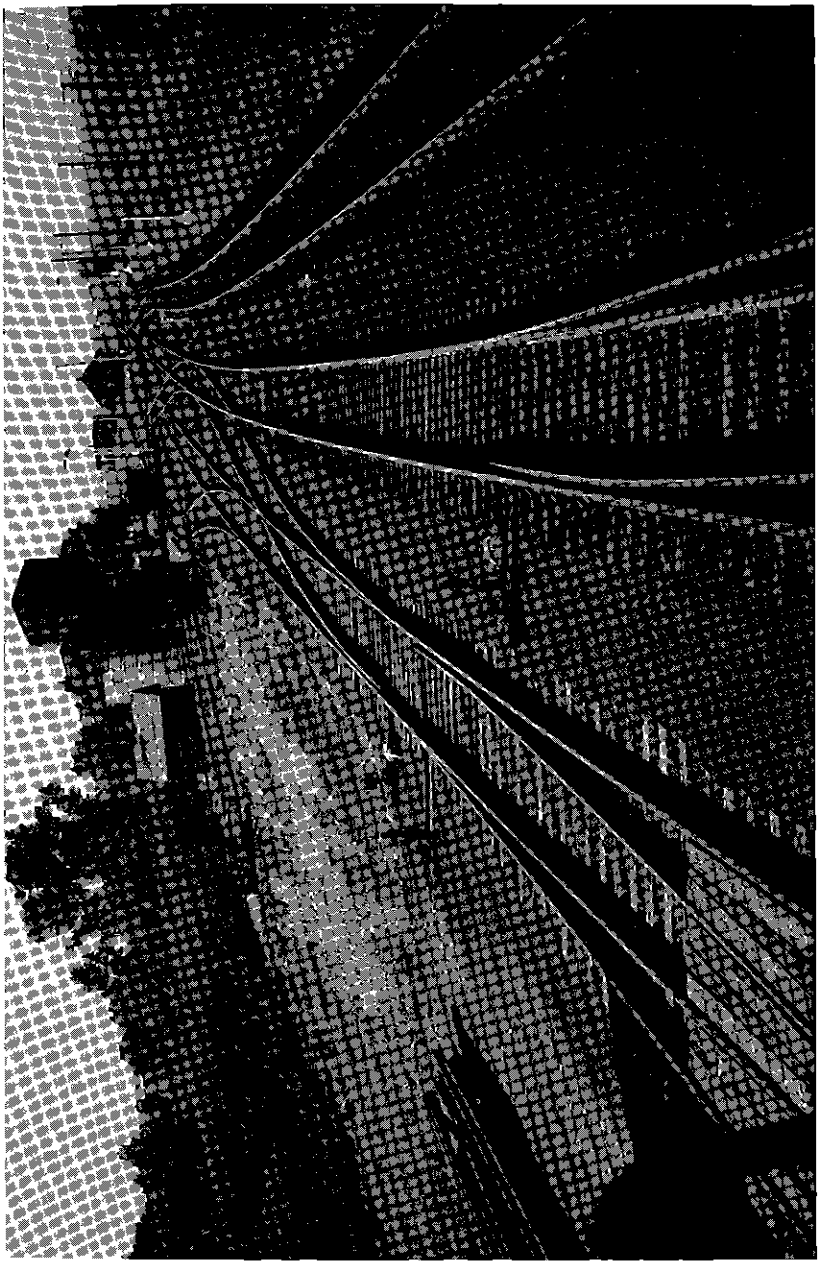

FIGURE 2.—View of tracks south of station at Napier

pilot of engine 4973, the front end of the first unit rested on the front end of engine 4973 The front portion of this unit was demolished a distance of 28 feet, the power plant and its base support were driven backward into the mail compartment The articulation end-castings at the rear end of the first unit and at both ends of the

FIGURE 3.—View of engine and first unit, showing damaged condition of front end of each

second unit were driven inward 8 to 16 inches and the ends of these two units were bent and damaged

The employees killed were the engineman of No 21, and a road-master who was in the power compartment The employees injured were the fireman, the conductor, and the brakeman of No 21

SUMMARY OF EVIDENCE

Engineman Cooper, of No 92, stated that the conductor, who was on the engine from Bigelow to Napier, advised him that they were to head in on track 4 at Napier and that Nos 61, 21, and 45 were being operated against the current of traffic from Forest City to Napier, this was understood thoroughly by the fireman and the brakeman The flagman was in the caboose After entering track 4 they waited until No 61, which was en route to Lincoln on the Wymore Division, had departed A separation was made behind the second car and the engine and two cars proceeded southward on the Wymore main track, one car was set out on the stock track and one car was picked up from track 2, the brakeman and the flagman assisted in performing the work A back-up movement was then made to the water crane, and when the engine passed Flagman Baldwin, who had remained near the north end of track 2 to handle the switch, the engineman asked him if he wished to ride, but the flagman declined to do so and signaled him to go back and take water While backing, the engineman saw the station helper close the junction switch, it having been opened for No 61, which departed about 4 13 p m, he asked his fireman if all the switches were clear and received an affirmative reply He stopped the engine at the water crane, leaving the independent air-brake applied, then looking southward and seeing No 21 passing the station, he warned the fireman The sun was shining and visibility was good at the time of the accident When his train arrived at Napier the train-order signal was at stop position and he received no order or clearance card at that point prior to the accident He understood that portion of the timetable rule which required operators to handle the cross-over and the junction switches He said that it is the practice for either the operator or the station helper, usually the latter, to handle these switches, and he could recall no instance when a trainman had handled the junction switch

Fireman Brown, of No 92, stated that as they backed toward the water crane after performing the work at Napier, he observed that the switches were lined properly for their movement, but he did not notice whether the switch on the main track was properly lined

Conductor Niday, of No 92, stated that at Bigelow both the brakeman and the flagman were with him in the station when the agent informed him that the northward track was out of service and that their train was to enter track 4 at Napier and would remain there for some time Before leaving Bigelow he gave the flagman some way-bills and told him that at Napier they would enter track 4, then he boarded the engine and advised the engine crew of the movements to be made After arriving at Napier he went to the station, and

when his engine and the first two cars passed he came out and told the flagman, who was on the rear car, to place one car on the stock track and to pick up one car from track 2 Conductor Niday walked to the road crossing south of the station, watched his engine while the car was placed on the stock track, then looked across and saw the station helper close the main-track junction switch He returned to the station and was informed by the operator that No 92 would follow No 42 from Napier As his engine and two cars were backing up he went out to the platform and signaled the brakeman to take water, then he heard the station whistle-signal sounded by No 21 and heard the station helper call to Flagman Baldwin that the latter had lined the switches wrong, he saw the flagman turn and run toward the junction switch, at which time No 21 was from 600 to 800 feet south of the switch and approaching at a high rate of speed The train entered the open switch and, while moving at a speed of about 50 miles per hour, collided with his engine He had not seen his flagman from the time the car was placed on the stock track until he heard the station helper's warning Conductor Niday stated that no authority had been received to use the main track, that there had been no occasion to use the junction switch in the switching movements, and that he had not instructed the flagman to open that switch It is customary for the operator at Napier to ascertain from the stations to the south the work to be performed by No 92 en route to St Joseph, and deliver to the conductor two copies of a message containing this information When no work is to be performed, the expression "highball to St Joe" is used to inform the crew, he said that at no time on the day of the accident had he used this expression to the flagman

Flagman Baldwin, of No 92, stated that while he was in the station at Bigelow the brakeman and the conductor were outside, and when he came out of the station, the conductor handed him a copy of the order relative to the meet with No 71 at Bigelow, and the brakeman told him that then train would be delayed at Napier, that No 61 was moving against the current of traffic, and that probably then train would follow No 42 out of Napier Nothing was said about No 21, and he did not know that it was moving against the current of traffic At Napier, after the cut was made for the work to be performed, the brakeman was on the first car and he was on the second car, as the engine and two cars passed, the conductor came out of the station and told him of the movements to be made and that they would have a highball for St Joe, which he interpreted to mean that then train would leave after the work had been completed Flagman Baldwin handled the stock-track switch and Brakeman Bell handled the switch at the south end of track 2 Flagman Bald-

wm then lined the switch foi his tiain to back out fiom tiack 2 and to entei the southwaid siding, and when the engine and two cais passed he called to the biakeman that he would handle the switch Then he opened the siding and junction switches, figuiing that if his tiain did not leave before No 42 the switches would be lined properly for the movement of that tiain He started toward the station and when neaiing the road ciossing south of the station he heaid a whistle sounded by No 21, but the tiain was not in sight He saw that the cioss-ovei at the end of double tiack was not lined foi a cioss-ovei movement, and looking back a second time he saw No 21 appioaching on the southwaid tiack, he staited immediately toward that tiain, giving stop signals with his aim, and ciossed over in fiont of it to the east side of the track He did not heai the engineman answer his signals, and he was unable to estimate the speed of the train oi to say whether the biakes weie applied when it passed him He stated that he did not obseive the tiain-oidei signal at any time, although the conductor had said nothing about having authority to leave when he said, "Highball foi St Joe," at the time he advised him of the woik to be peifoimed, he assumed that he would get the oideis and they would leave eithei before or after No 42 He stated that it is customaiy to operate Nos 71 and 61 against the cuiient of tiaffic when they are on the time of No 21, inasmuch as nothing had been said about No 21, he assumed that it would make its noimal movement He realized, howevei, that Nos 71 and 61 were ahead of the schedule of No 21 He said that he was thoioughly familiai with the conditions at Napiei and with the iules ielative to the handling of switches, howevei, he contiadicted himself several times as to the piactice of handling main-tiack switches, stating that fiequently he had lined the switch undei the diiection of the operatoi oi station helpei, and in othei statements he said that usually trainmen line the junction switch without permission

Biakeman Bell, of No 92, stated that he heaid the opeiatoi at Bigelow tell the conductor that No 21 was being opeiated against the cuiient of tiaffic fiom Foiest City to Napier, but he did not know whether the flagman was in the station at that time He did not heai the conductor say anything to the flagman iegaiding No 21 and he, himself, had no conveisation with the flagman regaiding that tiain, and the flagman was not piesent when Brakeman Bell and the conductor went to the station at Napiei, at which time the opeiator advised them of the ieveise movement of No 21 Immediately aftei aiiiving at the water ciane he cut the aii in and the biakes on the fiist cai had just become applied when No 21 stiuck his engine

Fireman Setzer, of No 21, stated that the aii biakes weie tested at St Joseph, a iunning test was made when leaving that point, and the biakes functioned piopeily en ioute Approaching Napier the

train was moving at a speed of about 75 miles per hour, and at the yard-limit board the engineman shut off power and applied the air brakes, reducing the speed to between 30 and 57 miles per hour. At the station board the fireman sounded the station whistle signal, it being the practice for the fireman to sound the whistle signals on the Zephyr trains. After rounding the curve to a point where a clear view ahead could be had, the engineman called, "Clear order board," and the roadmaster, who was behind the engineman, told him to increase speed as everything ahead was clear. The engineman opened the throttle and the fireman sounded the whistle signal for movement against the current of traffic, then he saw someone giving stop signals and warned the engineman accordingly. After proceeding a short distance the engineman applied the air brakes and then said, "The switch is red," and placed the brake valve in emergency position, at which time the speed was about 55 miles per hour and the train was about 200 feet from the switch. As the train entered the open switch the engineman told him to get off, he left his seat, opened the door and jumped off, and he thought the speed at that time was about 45 miles per hour. He stated that under normal conditions the train is operated at a speed of 40 miles per hour through the cross-over at Napier.

Conductor Crouch, of No. 21, stated that when his train was near the road crossing south of Napier yard he observed the train-order signal in the clear position, at which time his train was moving at a speed of about 75 miles per hour. He was in the second car when he felt an emergency application of the air brakes, at which time his train was just south of the junction switch. The train entered the open switch at a speed of 70 miles per hour and the speed was reduced to 50 miles per hour at the time of the accident.

Flagman Holding, of No. 21, stated that when approaching Napier he heard the station whistle-signal sounded, which was followed by a road-crossing whistle signal, but he felt no easing off on the throttle. He was standing in the vestibule between the third and fourth cars, and while rounding the curve at a speed of about 70 miles per hour he saw that the train-order signal was in clear position. He felt no reduction in speed until his train entered the open switch, then he saw fire flying and knew that the air brakes had been applied.

Station Helper Dodge, at Napier, stated that one of his duties is to handle the junction switches between the St. Joseph Division and Wymore Division main tracks, under instructions from the operator. After No. 61 departed, he lined the siding and junction switches back to their normal positions and locked them. He returned to the station and while there he heard a whistle sounded by No. 21. He left the station immediately and started toward the crossing where he receives the mail from that train, seeing that the switches were open,

he called to the conductor who was on the platform and started running toward the switch, meanwhile shouting to the flagman who was walking toward the station The flagman immediately turned and ran toward the switch, giving stop signals When he first saw No 21 it was just south of the curve and appeared to be moving at a higher rate of speed than when it is operated over the northward track He heard the whistle sounded when the flagman started to flag the train, he saw sand flying from under the wheels when the train was passing the car house, which is located 239 feet south of the junction switch As the train passed the station he could hear the screeching of the wheels, because of the brakes having been applied

Operator Reed, at Napier, stated that after No 92 entered track 4, the conductor and the brakeman came to his office and he showed them train order No 34 providing for the reverse movement of No 21, but he did not see Flagman Baldwin at any time After No 61 departed the station helper lined the siding and junction switches to their normal positions, the operator saw that the switches were properly lined and about 4 15 p m he gave the operator at Forest City the block for No 21 He did not observe the position of the switches again until he saw No 21 approaching, at a speed which he estimated to have been about 70 miles per hour, and then he saw the train enter the open switch He estimated the speed to have been reduced to about 50 miles per hour at the time of the accident Operator Reed stated that he had not cleared No 92, and had not given permission for the switches to be opened

Agent-Operator Olson, on duty from 8 a m to 4 p m, stated that the junction and cross-over switches are handled under his instructions by the station helper, and it is never permissible for a trainman to handle these switches without authorization from the operator Even in switching movements, if a train is on a siding, it is necessary for a trainman to obtain permission from the operator before handling either of these switches

Agent-Operator Soldier at Bigelow, stated that he did not think the flagman was present when he advised Conductor Niday and Brakeman Bell relative to the reverse movements of Nos 61, 21, and 45

Car Inspector Hanneman and Motor Maintainer Thomas stated that upon the arrival of the Pioneer Zephyr at Lincoln, Nebr, the night of October 1, they inspected and adjusted the air brakes on that train and found that the brakes functioned properly

Car Inspector McElwain, at Kansas City, stated that on October 2 he assisted in testing the air brakes on No 21, the test, which was completed at 2 15 p m, disclosed that the brakes were functioning properly

Car Inspector Fields, at St Joseph, Mo , stated that while he was making the regular inspection of the equipment of No 21 he observed the air brakes on the rear truck of the train apply and release, the regular test, however, was conducted by the brakeman

Records furnished by the carrier covering movements against the current of traffic between St Joseph and Napier show that there were 33 movements in July, 26 in August, and 19 in September

According to data furnished, the Pioneer Zephyr consisted of four articulated units designed and built to operate without being intermingled or associated with other cars It consisted originally of only three units, which are now the first, second, and fourth units, and which were completed in April 1934, the unit which is now the third unit was added to the train in 1939 The second unit was originally a passenger-baggage car, and was converted into a full baggage car These units were built of stainless steel, having 18 percent chromium, 8 percent nickel, and 0 12 percent carbon This material was cold-rolled to a minimum tensile strength of 150,000 pounds per square inch The total weight of the train, empty, is shown as 290,000 pounds

The builder's records indicate that this equipment was built according to the Post Office Department specifications for the construction of mail apartment self-propelled cars and trailer mail apartment cars operated in connection with self-propelled cars In these specifications, which were approved January 2, 1929, it is stated that where the total weight of an empty train does not exceed 300,000 pounds, the static end load is to be assumed as 100,000 pounds According to the builder, at the time these cars were built the Association of American Railroads had no specifications which were applicable, however, the specifications, issued by the A A R on March 24, 1939, for the construction of new passenger equipment, provide for cars which may be used in trains of over 600,000 pounds, light weight, in which specifications it is stated that the Railway Mail Service specifications as revised July 20, 1938, were used as a basis These specifications state that for a train weighing empty between the limits of 125,000 pounds and 300,000 pounds the assumed buffing static load is 100,000 pounds, this is identical to the 1929 specifications As the stress allowance in the new specification conforms substantially to those of the old specification, the cars conform not only to the 1929 specification but also to the more recent requirement

According to the specifications of the Post Office Department, when the sills and framing members of rolled steel have a minimum tensile strength of 50,000 pounds per square inch, the stress shall not exceed 16,000 pounds per square inch This may be increased by 20 percent for combined direct and secondary stresses, and where

other materials are used the stresses shall bear the same proportion to the ultimate strength of the material used For stainless steel the maximum allowable stress is

$$\frac{16{,}000 \times 1.20 \times 150{,}000}{50{,}000} = 57{,}600 \text{ pounds per square inch}$$

The records of the builder show that all stresses are well below this figure

According to the builder, fabrication was by the "Shotweld" process, which is similar to a spot weld, but controlled precisely and made in such a short time as not to affect the stainless properties of the steel and to eliminate appreciable annealing of the cold rolled metal These units were designed to provide a factor of safety of five above the normal operating loads, as set up by the Railway Mail Service In the Pioneer Zephyr the strength requirements were met without the use of the conventional center sill, using in lieu of this a floor system including the side sills The floor system may be considered the center-sill construction of the later specification The articulation castings were attached to two short sills extending approximately 10 feet from each end and tied into the floor system These sills were so attached to the floor system and other reinforcements that the required buffing load was transmitted to all the longitudinal strength members of the floor system The coach-dinette, the third unit in the train, which was built at a later date, was equipped with a light center-sill in addition to the normal longitudinal members, as this had become a standardized design

Using the required 100,000-pound buffing load, the builder's records show a maximum calculated stress of 37,530 pounds per square inch, as the maximum allowable stress under the 1929 specifications of the Railway Mail Service was 57,600 pounds per square inch, the structure was so designed and built that it could have carried 50 percent greater load without exceeding the allowable stresses

The underframe and engine support of the power car were fabricated of cromansil steel, arc-welded, and annealed Analysis of this material is as follows

30 to	60 chromium
1 05 to 1 40	manganese
60 to	90 silicon
	20 carbon

It had a tensile strength of 90,000 pounds per square inch and a minimum yield strength of 55,000 pounds per square inch, with an elongation of 25 percent in 2 inches

FIGURE 4.—View of left side of first unit, showing damaged condition of front end

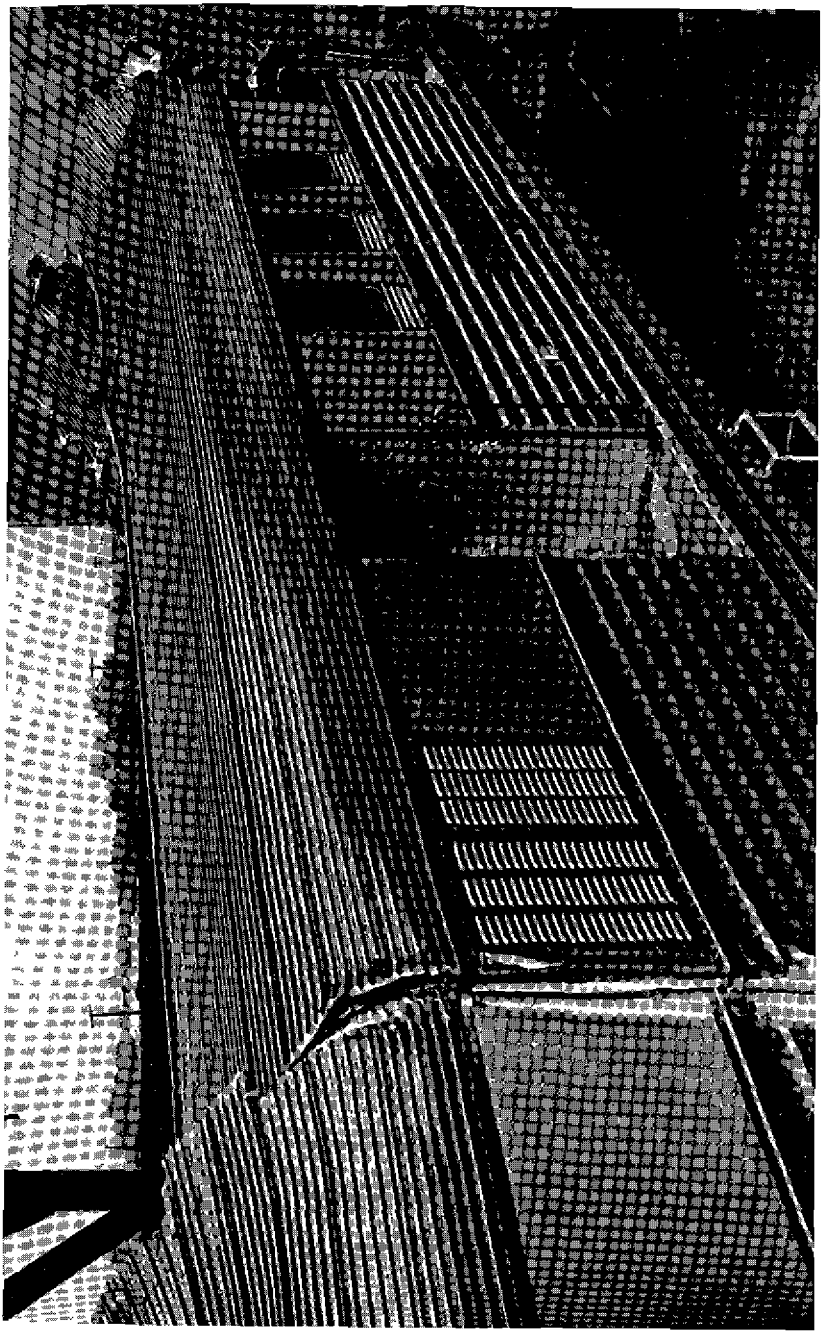

FIGURE 5.—View of rear end of first unit and forward end of second unit, showing damaged condition at articulated joint

The following is a statement of damage to equipment, furnished by the carrier

No 21		Engine 4973
First unit		
Car	$29,000	
Power plant	25,000	
	$54,000	$400
Second unit	5,000	
Third unit	500	
Fourth unit	500	
Totals	60,000	400

Engine 4973 was of the 2–8–2 type, and its weight was as follows

	Pounds
Weight on drivers	214,550
Total weight of engine	272,300
Tender empty	74,000
Tender loaded	195,300
Total weight of engine and tender	467,600

OBSERVATIONS OF COMMISSION'S INSPECTORS

Inspection of the track by the Commission's inspectors subsequent to the accident disclosed no evidence of sliding wheels or excessive use of sand The junction switch stand target was painted a dull red, oil had overflowed from the lamp, and dirt had collected on the surface of the target This switch could not be seen from an approaching train on the southward main track until within about 300 feet, and a distinct view of the target could not be had until within a distance of 90 or 95 feet

Inspection of the Zephyr equipment disclosed that the greatest damage occurred at the forward portion of the first unit as a result of the direct impact with the locomotive The first unit was practically demolished back to the mail compartment side door, a distance of about 28 feet, but the rear two-thirds portion of this body remained practically intact and was not noticeably distorted, the damage being localized at its rear end It was evident that the crushing of the forward end of the car structure progressed back to the power plant, which came in contact with the front of the locomotive boiler with such force that the whole power plant and its base were driven back about 6 feet The power plant and its base were extensively damaged Apparently the demolition of the forward portion of the first unit dissipated the force of the collision to such an extent that relatively small damage occurred to the train behind that point The articulation-end castings at the rear of the first unit and at both ends of the second unit were driven inward from 8 to 16 inches, the ends of these two units were damaged by crushing together but they

were not telescoped The damage to the train behind the forward third of the first unit was localized almost entirely at the ends of the first two units, and no general distortion or breaking up of car superstructures occurred The two end center-sill members of the first unit were buckled in such manner as to push up the floor in this region The floor corrugations were sheared and the corner posts and the rear edge of the roof were damaged The front and rear ends of the second unit were damaged in approximately the

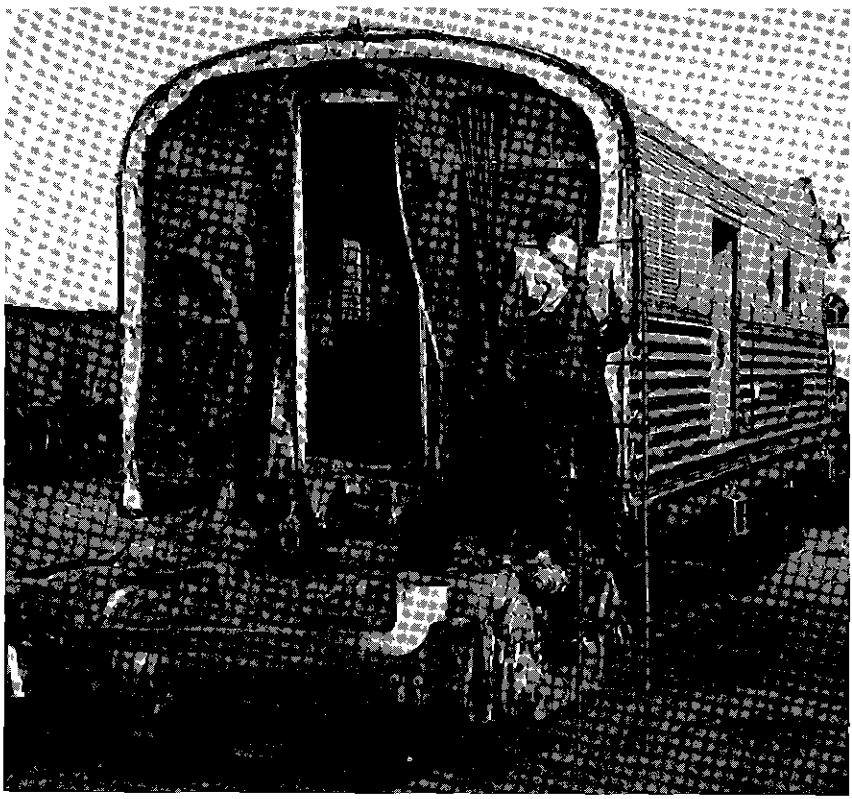

FIGURE 6.—View of rear end of first unit showing extent of damage

same manner, except that the buckling was more severe The furnishings were not torn loose by the force of the impact The rear two units were only slightly damaged

DISCUSSION

In the investigation it was developed that on the afternoon of the accident the northward track from Forest City to Napier was out of service and north-bound trains were being operated over the southward track against the current of traffic, apparently all mem-

bers of the crew of No 92 except the flagman had been apprised of that fact No 92 arrived at Napier at 4 p m, and entered track 4 at the north end of the yard The crew then proceeded to perform switching operations, and as the engine and 2 cars backed to the

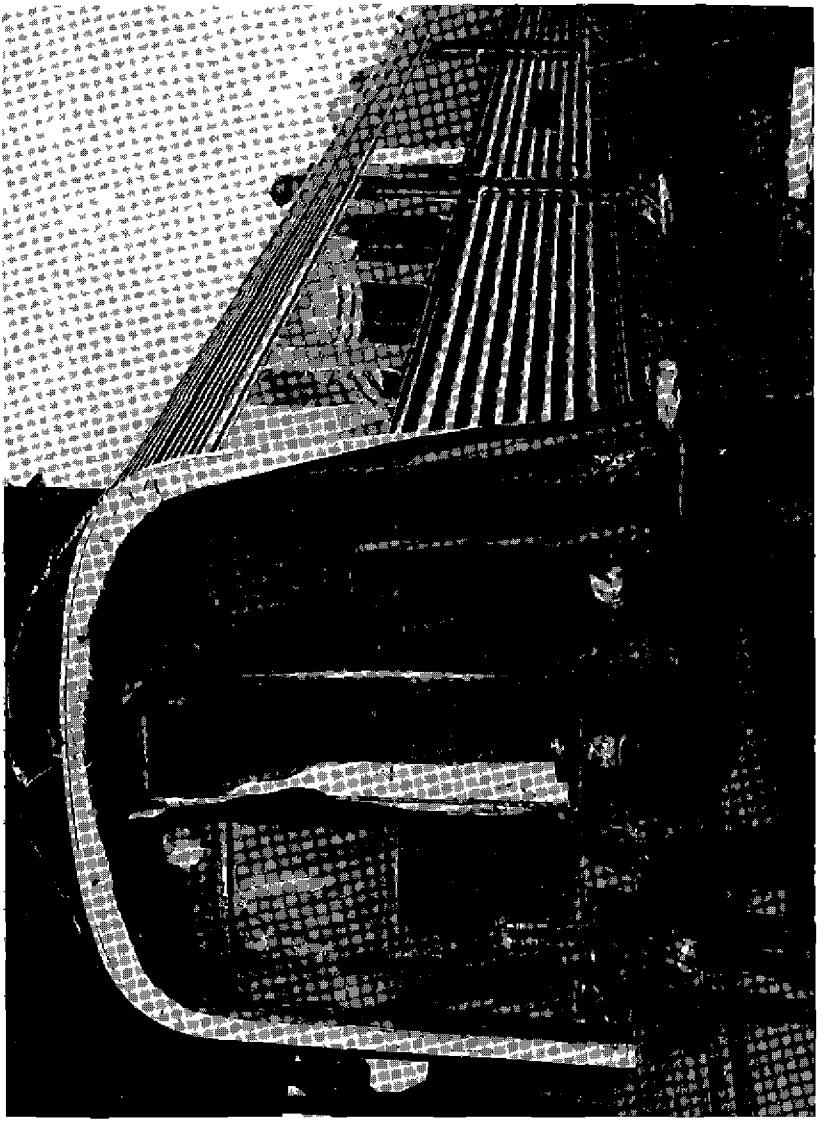

Figure 7.—View of rear end of second unit, showing extent of damage

water crane the flagman remained to realine the switch at track 2, then he walked over and opened the siding and junction switches, thinking that his train would leave after taking water or after the arrival of No 42, a first-class train from the Wymore Division, and scheduled to leave Napier at 4 40 p m According to his statement,

the flagman then started toward the station and was not far from the end of double track when he heard the whistle signal of No 21 as it approached, he saw that the cross-over at the end of double track was not lined for a cross-over movement, then turned and saw No 21 approaching on the southward track He ran back immediately, giving stop signals with his arm, but was unable to reach the junction switch before the train entered it The flagman stated that he did not know that No 21 was being operated against the current of traffic, that he was not in the station either at Bigelow or at Napier when the conductor received information relative to train movements, and that the only information he received from the conductor was a copy of the train order relative to the meet with No 71 at Bigelow, although the brakeman had informed him that their train would be delayed at Napier, that No 61 was moving against the current of traffic, and that probably their own train would follow No 42 from Napier The flagman said that at no time was anything said about No 21 According to the statement of the conductor, the flagman was in the station at Bigelow when the former received the information relative to the reverse movements, but the brakeman said that he did not know whether the flagman was in the station at that time, and the operator seemed to believe that he was not The flagman did not go to the station at Napier at any time, but as the engine and two cars passed the station the conductor came out, informed him of the work to be done, and according to the flagman, the conductor added, "Highball to St Joe," which the flagman interpreted to mean that they would leave on the completion of the work The conductor, however, said that at no time did he say anything about a "highball to St Joe" although it is customary to use that expression when no work is to be performed en route

Under special timetable instructions, the operator at Napier handles the junction switch, a short time prior to the accident the junction switch had been handled by the station helper for the passage of No 61, and after its departure the switch had been closed and locked, there was no reason for the flagman to handle the switch because No 92 had not received a clearance card and permission had not been given to open the junction switch Although the flagman stated that it is customary for a trainman to handle this switch, the statements of the engineman of No 92, the agent-operator, the operator, and the station helper indicate that it is not the practice for this switch to be operated without the operator's permission The investigation disclosed that in this case the flagman opened the switch without authority or instructions, and without full information concerning movement of the trains involved When his error was discovered it was too late to avert the accident

No 21 was moving at a speed of approximately 75 miles per hour when it approached the south yard-limit board at Napier According to the statement of the fireman, the engineman shut off power and applied the air brakes, but when it was seen that the track ahead was clear and the train-order signal was in clear position the speed was increased The fireman then saw a flagman ahead giving stop signals, he warned the engineman, who applied the air brakes and seeing the red switch target placed the brake valve in emergency position The fireman estimated the speed of the train to have been about 55 miles per hour at that time According to the statements of the conductor and the flagman, the train entered the open switch at a speed of about 70 miles per hour, and the speed was reduced to 50 miles per hour at the time of the accident, the flagman of No 21 stated that he felt no reduction in speed prior to entering the switch

The rules provide that trains must approach junctions and the end of two or more tracks prepared to stop, unless the switches are properly lined, also, that trains authorized to move against the current of traffic must proceed through yard limits prepared to stop short of train or obstruction The junction switch is located more than 4,900 feet north of the south yard-limit board, therefore, No 21 was required to approach this switch at a speed which would enable it to stop short thereof According to the evidence, the speed at the time the train entered the switch was not less than 55 miles per hour, because of track curvature and the target being but 11 inches above the ties, the target could not be seen clearly a distance of more than 100 feet Had No 21 been operated in compliance with the rules, undoubtedly this accident could have been averted The evidence indicates that this train was being operated in conformity with common practice at this point, which in turn indicates lack of proper supervision and enforcement of the rules

According to the evidence the equipment in this train was constructed of stainless steel, built according to the specifications of the Post Office Department for the construction of mail apartment self-propelled cars and trailer mail apartment cars operated in connection with self-propelled cars The fatalities occurred at the front end of the first unit, as a direct result of the impact, and 90 percent of the total damage to the train was on the first unit The greatest part of the remainder of the damage was localized at the ends of the second unit, the coupling arrangements were driven inward with resultant damage to the ends of the units without destructive telescoping action The rear two units were damaged only slightly

CONCLUSION

This accident was caused by a junction switch being opened without authority or instructions, which resulted in diverting an approaching train to an occupied track, and failure to control the speed of No 21 properly when approaching a junction and when operating against the current of traffic within yard limits

RECOMMENDATIONS

It is recommended that responsible officials of this railroad take necessary measures to correct the practices disclosed by this investigation which were not in conformity with operating rules

Respectfully submitted

S N MILLS, *Director*

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