[illegible] ACCIDENT ON THE
ST. LOUIS-SAN FRANCISCO RAILWAY NEAR
PLEASANT HILL, ARK., JULY 10TH, 1918.

September 13, 1918.

On July 10th, 1918 there was a derailment of a passenger train on the St. Louis-San Francisco Railway, near Pickinger, Ark., resulting in the death of 4 persons and injuries to 50 persons. After investigation of this accident the Chief of the Bureau of Safety reports as follows:

The Memphis Sub-Division of the Southern Division, on which the accident occurred, extends between Thayer, Mo. and Memphis, Tenn., a distance of 144.6 miles. It is a single-track line over which trains are operated by time-table and telegraphic train orders, supplemented by automatic block signals.

The train involved in this accident was south-bound passenger No. 105, known as the "Kansas City-Florida Special." It was en route from Kansas City, Mo. to Birmingham, Ala., and consisted of locomotive 1059, 1 mail car, 1 baggage car, 2 coaches and 3 Pullman sleeping cars, in the order named. All the cars were of all-steel construction and full-vestibuled. This train arrived at Thayer at 3.45 a.m. July 10th, and departed at 3.54 a.m., 9 minutes late, in charge of Conductor Welch and Engineman Lennes, with slow order No. 662, reading as follows:

To all trains south at Thayer:

educe to ten (10) miles per hour
over bridge 369.7.

F. T. S.

The train made the regular station stop at Mammoth Springs, Ark., a non-telegraph office 2.5 miles south of Thayer, and at about 4.12 a.m., was derailed at a point 6.5 miles south of Mammoth Springs and 3189 feet south of Pickinger Station, while travelling at a speed estimated to have been about 50 miles per hour.

The entire train was derailed excepting the two rear Pullman cars. The locomotive travelled 206 feet from the point of derailment and came to rest in an inverted position against a rock bluff on the east side of the track or outside of the curve, with its rear end about 19 feet from the roadbed and its front end about 15 inches from the track. The pony trucks remained on the roadbed about 25 feet south from where the locomotive lay, the front pair of wheels in their normal position on the rails and the rear pair on the ties. The tender turned on its side and lay on the east side of the track, between the rear of the locomotive and the track, its rear end resting on the embankment at about the edge of the roadbed. The mail car was thrown over the top of the locomotive, struck the rock bluff on the outside of the curve and was deflected by it to the opposite side of the track, coming to rest on its right side, approximately 60 feet ahead of the locomotive, down the embankment.

The rear vestibule of this car was torn away for about 15 feet in striking the rock bluff and the car was stripped of its trucks. The baggage car came to rest on the right-hand or inside of the curve, with its front end resting on the tender and its rear end down the embankment about 50 feet to the water's edge; this car buckled, was stripped of its trucks and was badly damaged. The forward coach, used as a smoking car, came to rest on the left-hand side of the track in an almost upright position, the front end resting against the tender and about 15 feet to the rear of the locomotive; its right-hand side was badly telescoped; the superstructure of the rear end was badly crushed for about 15 feet by the coach immediately in its rear. All the fatalities and most of the injuries occurred in this car. The second coach was stripped of its trucks, and /telescoped the rear end of the smoking car as far back as the vestibule. It came to rest on the left hand side of the track in an upright position, with its rear trucks on top of the embankment. The third sleeping car from the rear of the train had its front truck off the rail, standing on the ties. The weather was cloudy and misty.

Beginning at Mile Post 550 and proceeding south there is about 1,000 feet of tangent track, followed by a 3° curve to the left, 615 feet long, then there is 1,700 feet of tangent track, following which is a spiral or easement 540 feet in length, which leads to a curve to the

right approximately 1100 feet long. This is a compound curve, having a curvature of 4°30' for a distance of about 150 feet, then 5°58' for 420 feet, and 6°3' for a distance of 520 feet. The derailment occurred about 170 feet from the southern end of this curve. Approaching the point of accident from the north the grade is slightly ascending, being about .8% at the point of derailment.

One mile each way from the point of accident the track is laid with 85-pound steel rails, 33 feet in length, rolled in 1910 and laid in December, 1912, single-spiked to the ties, which are about 80% white oak and 60% red oak, treated and spaced 20 ties to the rail and in fair condition. Tie-plates were used on this curve held with two spikes to the plate, one on the inside and one on the outside; the rails were fully spiked. Rail joints consisted of 26-inch, 6-hole angle bars, in good condition and with all joints tight and fully bolted. No anti-creepers or rail braces were used.

On the outside of the curve where the derailment occurred there is a high rock bluff, the inside of the curve being bordered by Spring River. The track at this point is laid on a shelf along the edge of the rock bluff. Proceeding south, the right-hand side is the west or inside of the curve; the left-hand side is the east or outside of the curve. The embankment on which the track is laid is stan-

dard width of 20 feet, with good shoulders and in good condition. The ballast is of crushed stone, 12 to 18 inches deep, and the roadbed has about a 20-foot crown.

The first indication of derailment was about 66 feet south of Mile post 350 plus 35, where it was evident from the spikes being pulled that the outside rail of the curve had been pushed outward for a distance of 27 feet, and where there were flange marks on the web of the rail for a distance of 6 feet on one rail and for the entire length of another, or a total distance of 39 feet; it was evident by the spikes being pulled and the marks appearing on the web of the rail that the rail had turned over and that the angle bars were not on the rail at the time the wheel marks were made. At the south end of the last rail section where these marks appeared the track separated on account of the angle bars breaking or pulling off; these angle bars were not found, but the bolts and nuts from this joint were found, and they showed evidence of being sheared off, supposedly by the engine drivers. The inside rail was broken 210 feet south of the point of derailment and thrown off down the right side of embankment; the outside rail was broken 160 feet south of the first indication of derailment. Beginning at this separation, the rails, ties and ballast were stripped clean by the equipment for a distance of 150 feet south, where the engine and tender came to rest; all of this debris was piled up under the engine and tender and

front end of smoker.

For a distance of 150 feet back of the point of derailment the superelevation is fairly uniform, varying gradually from 6½ inches to 6-5/8 inches; at a point 30 feet farther north the superelevation is 5 inches; at 100 feet farther north the superelevation is 7 inches, or a maximum variation of 2 inches in 100 feet. The gauge immediately back of the point of derailment varied from tight to ¾ inch wide. From a point 130 feet north of the point of derailment on the outside rail, there was a rolled condition, or flowing of the steel on the outside edge of the top of the ball of the rail. The outside rail at the place where the derailment occurred was worn to the minimum factor of safety and the inside rail was also worn slightly. Located at varying intervals over a distance of approximately 480 feet back of the point of derailment there were seven kinked rails on the outside of the curve, there being two rails having two kinks within their length. About 4 miles north of the point of derailment were 5 kinked rails, all appearing in rails on 6° curves and at points where the track showed an overgauge of ¼ inch to ½ inch.

Conductor Welch stated that in running over this stretch of track the previous trip at a speed of about 50 miles per hour, he had not noticed anything unusual. He said they left Thayer about 9 minutes late, after receiving a slow order on form 19, and thought they would have made

up this 9 minutes about at Hoxie, which is 58.2 miles from Thayer. He did not think they were stopped at Mammoth Springs over 2 or 3 minutes receiving passengers and discharging mail and baggage; leaving there the train moved off smoothly and continued running very smoothly and evenly. He had no intimation of impending trouble; he estimated their speed at 50 miles per hour, but did not think it was unusual; he stated that if the speed had exceeded that rate he would have signalled the engineman to decrease the speed.

Engineman Underwood, who ran engine 1089 on this trip from Springfield to Thayer, stated that he left Springfield on train No. 105 on the night of July 17th, and from the inspection he made of the locomotive prior to his departure he found the work which he had reported had been done, and it was in good condition. He stated that the maximum speed on his run was 50 miles per hour and the locomotive could not have ridden any better than it did and in his opinion was in first-class condition. He runs this locomotive regularly and has handled this class of locomotives ever since they have been built. He did not notice any lurching of the engine when going around curves, nor did he encounter any unusual track conditions between Springfield and Thayer. He recognizes 50 miles per hour as the maximum limit for passenger trains. When he turned the locomotive over to Engineman Lehnes at Thayer the only defect of mention was the journals of two of the tender truck wheels, which had been

running a little hot, but which he considered nothing serious.

Flagman Gibson, of train No. 105, stated that they left Thayer at about 3.52 and that the accident occurred about 4.10. There was nothing unusual in the handling of the train after leaving Mammoth Spring except that he considered they were travelling at an excessive rate of speed; faster on this night than it had run on the two previous trips he had made on it. He estimated the speed at the time of the derailment at 50 miles per hour. He was riding in the smoking compartment of the rear Pullman car and the unusual rate of speed caused him to comment to the Pullman porter, who was with him, that he didn't see how they stayed on the track when they were running so fast.

Train Porter Stenson stated that 3 or 4 minutes was consumed in making the stop at Mammoth Spring; after leaving Thayer and up to the time the train was derailed he thought the speed on curves was greater than when between Springfield and Thayer. He estimated the speed of the train at between 45 and 50 miles per hour; he was in the smoking car and considered that the engineman was running too fast around the curves, but did not comment on it to anyone.

Engineman Kellner, of train No. 106, stated that his train passed the point where the derailment later occurred, at about 2.26, approximately 1 hour and 40 minutes before the derailment occurred, at a speed he estimated at 45 or 46 miles per hour, his train being 2 hours and 30 min-

utes late, and he noticed nothing wrong with the riding of his engine at or near that point. He considered the track at that point safe for a speed of 80 miles per hour.

Operator Burton, who was on duty at Thayer, stated that train No. 105 arrived at Thayer at 5.43 a.m., 3 minutes late and left at 5.54 a.m.

General Roundhouse Foreman Woodhouse, at Springfield, stated that, on July 17th, when locomotive 1059 arrived there on train No. 106, the work report turned in by Engineman Underwood, who had handled the locomotive into Springfield, called for among various other repairs, the leveling of engine on left side and straightening of the equalizer; his work reports indicated that these repairs had been effected by fitting one new driving spring and leveling up the other two and applying a spring hanger key and safety blocks; lateral liners were applied to the right trailer truck wheel, as called for, to bring it to the standard, or 3/8 inch. The work reports showed that all work called for had been performed and had passed inspection and the locomotive left there in good order.

District Engineer Swarts stated that he considered the point of derailment about 27 feet north of the point where the flange marks on the web of the rail indicated it had turned over from the fact that the gauge at that point was kicked out sharpl about 5/4 inch and the outside edge of that rail showed it was l ing a little and for about ⅝ inch below the top of the rail the had scaled off, indicating there had been some heavy pressure on as the maximum variation of alignment was 3½ inches in a distanc 130 feet, he did not think it would have had any effect on the

riding qualities of the track and considered the alignment good. For the first 150 feet back of the point of derailment the track had a variation in elevation from 5½ inches to 6-3/8 inches, or 5/8 inch. From 180 to 280 feet back of the point of derailment there was a maximum variation in elevation of 2 inches. He considered the superelevation around the curve as very good, it being gradual and containing no sharp breaks. The gauge for 500 feet back of the point of derailment and on the curve shows a variation from snug gauge to ¾ inch over-gauge, partly due to the wear on the outside rail, which he did not consider excessive for seven years of service on such a sharp curve and a point of high speed, and partly due to tie plates slipping on the ties. The outer rail was worn approximately 5/8 inch on the gauge side and 1/4 inch on the top; the inside rail was worn practically 5/16 inch on the top, with very little flow in the middle. He considered the track in very good condition and absolutely safe for the time card speed of 50 miles per hour. The rail on the curve at the point of derailment had been staked for an elevation of 6 inches, which elevation they considered within the factor of safety for a speed of 59 miles per hour; above that speed there would be danger of derailment. Back of the point of derailment on the outside of the curve, he found 6 rails which showed sharp line kinks. The first was 16½ feet back of the point of derailment and was at the quarter point of the rail; the next two

kinks occurred in the same rail, both on the short quarter, one 107 feet and the next 131 feet from the point of derailment. The next two kinks occurred at the short quarter of the rail respectively 139 feet and 156 feet back of the point of derailment. Then there were three kinks in the center of the rails located respectively 178 feet, 352 feet and 478 feet back of the point of derailment. These kinks were short and sharp and showed a variation from true line at the greatest point of approximately .6 of an inch. The minimum kink was about..4 of an inch. These kinks indicated that the engine or whatever caused them had probably been lurching badly and was exerting heavy pressure on the outside rail. About 2 miles north of the point of derailment they also found the same condition as to kinks, where, on a 6°33' curve they found four rails which were kinked on the outside of the curve, in very much the same manner as the rails at the point of derailment. He did not think that locomotive 1059, running at 50 or 55 miles per hour, would kink rails in this manner unless there was something materially wrong with it and knew of no other rails having been kinked in this manner. He thought the engine was lurching and the same force which kinked these other rails started to kick a kink in the rail at the point of derailment and it gave way. The fact that the pony trucks remained on the track and the front pair of wheels did not leave the rail, indicated that it was the drivers or heavy part of the engine

which disturbed the rail. He thought that the rail turned over under the engine, as he considered the good condition of ties and tie plates would prevent its spreading.

Assistant Superintendent Haines states that he went over this particular piece of track Tuesday night, July 16th, on train No. 106 and there was nothing which attracted his attention concerning the track. When he arrived at the scene of the derailment he noticed some kinked rails about 100 feet from the rear of the derailed train and near the side of the first sleeping car he noticed the spikes on the outside rail were partly pulled out of the ties. He examined the rails and discovered wheel marks in the web of a rail which was standing in its natural position and also noticed a mark on the outside of the ball of the rail, which showed that a wheel had rolled that part of it, and which indicated to him that the engine was tipped to the outside of the curve, due, in his opinion, to high speed and insufficient elevation. On examining the rail from that point to about 150 feet to the rear of the train, he and the Assistant General Manager decided that the deformity on the rail was caused by the engine turning on the outside of the curve and the wheels following the rail out to the end, with the flanges running along in the web of the rail, while the engine was turning over. In his opinion the engine turned to the outside and threw the rail in and he did not believe the engine spread the track, but that the rail was turned over by the

cars following the engine. In his opinion the weight of the engine on the one outside rail severed the track at the point mentioned and the following cars spread the rail. In the rear and to the north of the point of derailment the track showed a number of kinks; within a distance of about 600 feet several rails were kinked at more than one point, caused, in his opinion, by the engine tilting to the outside of the curve, due to excessive speed, and shading the weight on the outside wheel, the rear driver or trailer truck surging against the rail and causing the rail to kink. The only evidence he had of the time of the accident was from the watch of the mail clerk, which he found open in one of the pigeon-holes of the mail apartment, and the time shown was 4.08. He considered the track good for the speed permitted by the rules, 50 miles per hour.

Roadmaster Tooley stated that the rails used at the point of derailment and for some distance each side were received in 1910, but they had laid on the ground about two years before being laid; the ballast previously consisted of mixed rock and gravel of about 10 inches depth, but about four years ago they put in 12 inches of new rock on top of the old ballast, it being thoroughly pick-tamped. He stated that he inspected the track from time to time and had never found any indications of the track being center-bound. The rails had a 6-inch base and tie-plates were used, which, in his opinion, rendered the use of rail braces unnecessary.

About two months ago they had discussed the changing of the rail on this curve; the new rail had been received about a month ago and had been on the ground for some time and they intended changing it some time during the summer, before the winter came. The elevation called for on this curve, as specified by the engineer's stakes, was graduated, but about where the derailment occurred was 6½ inches and his instructions to section foremen were to maintain that elevation. He said he had not gauged or leveled this track since the latter part of March or the first part of April; at that time the entire curve was worked up for both curvature and elevation; on account of the rail then being somewhat curve-worn it was necessary to w ike the rail in a part of the way to bring it to gauge. The roadbed has a 32 foot sroom, which he considered standard for that kind of track; instead of the usual 6 inches of ballast from end of ties to shoulder of ballast, they had been using 12 inches, with a slope of 1½ to 1. The outside rail of the curve was curve-worn about ¼ inch at its top, permitting the flanges of the wheels to cut the angle bars to the extent that they were just beginning to show indications of cutting, but not sufficiently to cause any damage. The inside rail was flattened down possibly 1/8 of an inch; where the engine kinked the rail out on the curve there was a variation in gauge of from ¼ inch to nearly ½ of an inch. The condition

of the ties at point of derailment and for a half mile adjacent was good, as they had laid new ties in June, and he considered the track at that particular point in as good general condition as that on both sides of the point of derailment. He had had no complaints from any source that there were rough places in this section of track and as the roadbed was firm, the track being fully bolted and spiked, the joint ties all in position and properly spiked, he considered this section of track good for a speed of 60 miles per hour. About the 6th of the month he had walked over the track and examined all of the bolts around this curve and found them all tight and none missing. On the 15th he had gone over it alone on a motor car and inspected the gauge and elevation, as well as the condition of the ties; he said he found no unsound ties and the rail was fully bolted and spiked. He passed over this section of track at about 1.30 p.m., the day before the accident, riding in the observation car of train 103, and again on train No. 105, which passed that point about 2.00 a.m. about 1 hour and 45 minutes before the accident occurred, and noticed nothing unusual. On the curve near Mile Post 460, about 6 miles north of where the accident occurred, there were a number of kinks similar to those in the immediate vicinity of the accident, which were discovered at the same time and which he thought were caused by this same engine. From the looks of the kinked rails he concluded the derailment must have been

caused by high speed, which turned the rail over. He thought the speed must have been nearly 60 miles per hour.

Roundhouse Foreman Kirkpatrick at Thayer stated that after the derailment he inspected the locomotive and tender, but could find nothing which might have contributed to the derailment.

Engine Inspector Davis at Thayer stated that locomotive 1059 arrived at the roundhouse at 3.45 a.m. and departed at 3.55 a.m. and in the interval he inspected the boxes and running gear as well as the brake beams and brake shoes, both on the drivers and tender; the engine was in good condition as to flange and tread wear and he saw nothing which might have contributed to the derailment.

Train Inspector Thomas stated that he spent 8 minutes inspecting train No. 106 on the morning of the 15th, when it arrived at Thayer and made a complete inspection of boxes and brakes, couplers, brake beams and shoes and found all in good condition.

Section Foreman Burr stated that for about 8 years he has been foreman of the 6-mile section extending from Mile Post North 348 to Mile Post South 354. He said the ballast formerly consisted of chat and crushed stone, but 4 or 5 years ago had been reinforced with about 12 inches of crushed stone; when they first surfaced the track for elevation around the curve it gave some trouble but since it settled they had had no trouble with it. The track on this

new ties were also laid; he said they put in 1059 new ties on his entire section, but could not remember how many new ties had be n laid on this curve. At the north point of the track where the curve starts, the elevation was ½ inch and gradually increased to 6 inches and it was their intention to maintain a 6-inch elevation on this curve. He had not done any work on that particular part of track for about two weeks before the derailment occurred, except that he had smoothed up about half way around the curve from the south end, which included the point where the derailment took place. tried his level board and found the elevation good and that the gauge was holding well. On the day before the accident he passed over the track twice in a motor car. The general condition of track bolts was tight. The inside rail on the curve was worn to the extent that a few of the joints were wearing the angle bars, but not badly. He said that, in order to prevent sharp flanges from hitting the joints and breaking the flanges, he and the foreman had been intending for about a month to change the rail on the curve and had the new rail on the spot ready for the re lacement; although they did not consider it dangerous, they concluded it was necessary to change it just as soon as they could get to it. He stated that he arrived at the scene of the derailment at about 4.40 a.m./and examined all the ties which were torn up by the derailment but discovered none which were badly decayed.

although he found some ties which could not be used again. He stated that the ties in the track were all good and would last 12 months. North of the point of derailment he discovered some kinks in the rail which he was positive were not there when he went over the track the day before, neither was the kink in the vicinity of Mile post 648 present when he passed there about noon the previous day. He did not think the condition of the track had caused the derailment.

Wrecking Foreman Malthis stated that when his crew arrived at the scene of derailment, at 11.30 a.m., they found the track torn up for about 150 feet back of where the locomotive lay, but the roadbed generally seemed to him to be in good condition. About 200 feet to the rear of the train he found rails kinked about 16 or 17 feet apart. The outside edge of the rail on the outside of the curve had been rolled for some distance, which he thought had been caused by the locomotive drivers turning the rail in. He examined the equipment as closely as possible under the conditions, looking for the cause of the derailment, but found nothing which in his opinion contributed to it.

Wrecking Foreman Williams stated that the day after the derailment he examined the equipment but found nothing defective which he thought might have contributed to the derailment. He said the roadbed at this point was very solid and the ties were all good up to the end of the rails; the rail was curve-worn, but not to a degree he considered unsafe.

His conclusion was that the outside rail of the curve had been turned over, due to the excessive speed of the engine; he thought the engine crowded the outside rail out until the wheels on opposite side of the track dropped inside the rail; he did not think the speed around the curve would have derailed the train, had not the rail been turned over. He thought this curve was good for a speed of 50 miles per hour and that speed in excess of this had caused the derailment; in his judgment the speed of the train must have been over 75 miles per hour.

Master Mechanic Norman stated that after the derailment, in company with the superintendent, he carefully inspected the running gear of locomotive and tender but found nothing which might have contributed to the derailment and considered the engine to have been in first-class condition. The truck wheels were in perfect gauge; the front pair of drivers showed 3/16 inch close; the main and back drivers were possibly 1/32 inch tight, but he considered this well within the factor of safety. The tires showed 7/32 inch wear, but the condition of flanges was good; the axle on back pair of drivers showed evidence of having been sprung, but he could not say whether or not this was sustained in the accident; brake shoes, brake rods, brake beams, etc. were all in place. In his opinion the kinks in the rail were due to high speed, the drivers being raised off the out-

side rail and the weight of the entire engine thrown on the three wheels on the left hand side of the engine, which was indicated by the marks on the outside ball of the outside rail, which turned over.

Evidence with respect to the speed of train 105 at the time of the derailment is conflicting; the testimony produced at the investigation shows that this train left Thayer at 6.54 a.m. and made station stop at Mammoth Spring, consuming 3 minutes in so doing, and the accident occurred at 4.12 a.m. The distance from Thayer to the point of derailment is 11.088 miles and train No. 105 travelled this distance in 15 minutes, which is at the rate of 44 miles per hour. The rate of speed provided by the time table schedule for this train allows 16 minutes elapsed time between Thayer and Pickinger, which is at the rate of 39 miles per hour. There was nothing to indicate that the speed of the train was checked or reduced while rounding this curve and the substance of the statements of the surviving employees on the derailed train indicate that the train was running much faster than usual on that curve; this, with the condition of the derailed equipment, leads to the belief that train 105 was running at a much higher rate of speed than 44 miles per hour when the derailment occurred. While Engineman Johnes used poor judgment in operating his train at an unsafe rate of speed on the curve where the derailment occurred, he violated no rule, as there is no speed restriction on this curve, other than the general time

time card rule which limits the speed of passenger trains to 50 miles per hour. The track on this curve was manifestly unsafe for the passenger train speeds authorized by rule.

This accident was due to excessive speed in view of track conditions existing on the curve where it occurred. The rails on this curve were badly worn making it unsafe for the maximum speed allowed by the rules. In addition to the curve-worn rails, the superelevation of the outside rail was not sufficient either for the speed at which this train was running or to provide an adequate margin of safety for trains operated at the maximum speed of 50 miles per hour allowed by rule. The combination of these conditions resulted in the derailment.

In connection with the statement of District Engineer Swarts that he and other officials of this road considered the superelevation of 6 inches on this curve of 6°3' sufficient to provide the necessary factor of safety for a speed up to 59 miles per hour, attention is called to the recommended practice of the American Railway Engineering Association, which specifies an elevation of the outer rail of 6¼ inches on a 6° curve for a maximum speed of 40 miles per hour, and 8 inches for a maximum speed of 45 miles per hour, 8 inches being the maximum elevation recommended for ordinary practice. The superelevation on this curve was at no point sufficient to permit a safe speed in excess of 40 miles per hour, yet passenger trains were permitted to run 50 miles per

hour. In view of the condition of this curve, extra precautions should have been taken to insure low speed while rounding it, and orders to that effect should have been issued The responsibility for this accident rests with the officials of this road in not changing the rail on this curve before it had reached the minimum factor of safety for the running of high speed trains, and failure to issue caution or slow orders on track in this condition, thereby reducing speed to the measure of safety until the proper track conditions had been established.

None of the employees involved in this accident were on duty in excess of the statutory period, the engine crew having been on duty only 27 minutes and the other employees 5 hours and 12 minutes, after adequate rest periods.

R.L.