

BEFORE THE RAILROAD COMMISSION OF THE STATE OF CALIFORNIA.

In the matter of an investigation)
into methods and equipment of the)
Pacific Electric Railway Company)
in the operation of its lines of)
railway.)

Case No. 431

ON THE COMMISSION'S OWN INITIATIVE.

EDGERTON and GORDON, Commissioners.

O P I N I O N

At about 9:20 P.M., on July 13, 1913, a three car electric train operated by the Pacific Electric Railway Company on its so-called "Short Line" between the City of Los Angeles and Venice, collided with a standing three car electric train operated by the same company, said collision occurring at, or near, a station called Vineyard. As a result of this collision, sixteen people died and many were seriously injured.

Within fifteen minutes of the accident, a service expert of this Commission was on the ground, he having been engaged for some time prior thereto in investigating the service and operation of this railway. From the time of the accident to the time of the hearing in this matter, the experts of the Commission were continuously engaged in investigating the causes of this collision, and also the conditions of operation of this electric railway system operating nearly 1,000 miles of trackage.

On July 22, a preliminary hearing was had herein, at which hearing it was agreed on behalf of the Pacific Electric Railway that a consideration of grade crossings should be

added to this inquiry without further notice to the parties interested.

Thereafter, another and more extended hearing was had at Los Angeles, beginning on the 31st day of July and ending August 2d.

Consideration was first given the matter of safeguarding the crossings of the Pacific Electric Railway tracks by highways and protecting vehicles and pedestrians against the danger of being struck by moving trains.

The City of Los Angeles and the County of Los Angeles were asked to participate in the hearing through representatives, and such representatives were present.

It was announced that this Commission has determined to assume jurisdiction in the matter of railroad crossings in cities.

It was impossible to have prepared and presented at the hearing, accurate data as to the location of present existing dangerous crossings, without which data no intelligent conclusion could be arrived at.

Consideration should be given, first, to the location and identification of existing dangerous crossings and the means of protecting the same. Second, to the possibility of separating crossings which are at present dangerous and the means to bring about such separation. Third, to a consideration of whether or not grade crossings should be permitted in the future, and if it be determined that it will be impossible to separate all future crossings, then to the proper safeguarding of such grade crossings, and finally, consideration should be given looking toward the laying down of a rule by which all grade crossings will be eventually eliminated, probably on a basis of a progressive elimination.

At this hearing all of the trainmen who operated the standing train which was collided with and the moving train

which ran into it on July 13, were called by the Commission as witnesses and carefully examined, both as to the facts surrounding the collision and as to their employment and training for the positions which they occupied. In addition, the chief engineer of the Railroad Commission, and his service experts were examined as to their knowledge of the physical condition of the Pacific Electric, its equipment, rolling stock, methods of operation, etc. The Pacific Electric Railway Company introduced evidence in relation to all of these matters.

In justice to the Pacific Electric Railway here under investigation, it should be said that its president has cooperated with the Commission and its experts in an endeavor to devise and put into effect methods and equipment calculated to bring about safe and efficient operation of this system.

For the purpose of a careful and intelligent consideration of the matters here involved, which relate to safety, we will divide the system into heads, or departments, and then comment upon the condition found in these various departments, both as to existing conditions and suggested betterments.

The system will be divided into three main departments, namely, (1) Roadbed, including rails, etc; (2) Equipment, including rolling stock, terminals, etc; (3) train operation.

Department (3) will be subdivided into (A) Rules; (B) Discipline; (C) Signal Appliances. (C) will be subdivided into (a) Road Crossings; (b) Interlocking Appliances; (c) Automatic Signals.

Taking these departments up in their order, we find that as to Department (1), the Pacific Electric Railway operates over rights of way owned by it, except where it operates over city streets.

This railway system is a consolidation of a number of independent systems, not all of which were in good condition

at the time of such consolidation, but since the advent of the present management, the roadbed, rails, etc., have been brought up to a high state of efficiency. To find the roadbed to be rock-ballasted over a large extent of this system and the entire track structure to be very efficient.

Department (2), Equipment, is found to be in good condition. While there are still being operated some of the cars taken over at the time of the consolidation, the larger percentage of the equipment now in use is new, and of standard construction with the latest and most improved braking devices. The testimony of the representative of the company furnishing the air-brakes to this system is that the Pacific Electric officers have in every instance at once adopted any improvement for the bettering of the braking appliances. The platform frames of the cars in use are unusually heavy, being re-enforced with steel and well calculated to resist heavy shock. The superstructure of these cars is of wood, and the type of car mostly in use is one with an open end. It is now proposed to re-enforce the superstructure of cars hereafter to be purchased with steel in an attempt to produce a car which will, as far as possible, resist the shock of collision, but it is not to be expected in view of all available experience that a car can be produced which will resist the shock of a collision to an extent which will safeguard passengers. There has been some discussion as to whether or not additional safety could be provided by abolishing the open ends of these cars, thus permitting of a stronger superstructure, but in view of the fact that there is a widespread demand in Southern California for open end cars which will permit passengers to enjoy the air and scenery, and that it has not been shown that a material addition to safety would occur by abolishing these open ends, we do not feel justified in compelling all cars to be closed. We feel that the effort

should be directed more to the prevention of collisions than to the operation of cars which would come safely through collisions.

Department (3). Train Operation:

(A) Rules. We find that the rules of this company embody those laid down by American Electric Street and Inter-Urban Railway Association. It may be said generally of these rules that they are efficient and standard, but in some respects revision is desirable, particularly with a view to eliminating certain of them, which are not necessary and which only encumber the mind of the operator, others should be made more definite, and inconsistencies should be eliminated.

It has been found that among the prescribed train order forms, some are never put in use, and these should be eliminated.

Rule 147 provides for a spacing of trains of not less than 2000 feet, whereas Rule 150 provides that upon the stopping or delaying of a train under circumstances in which it may be overtaken by another train, the conductor or flagman must go back immediately with stop signals a sufficient distance to insure full protection. This rule further provides that the flagman shall go back 500 feet, place a torpedo, then continue on to 1000 feet, and it is evident that with trains running ^{at} from 40 to 60 miles an hour, 2000 feet apart, it will be utterly impossible for a flagman to get back 500 feet, much less 1000 feet.

In that part of Rule 150 dealing with the use of fuses there should be such changes as to permit the use of fuses under any circumstances which will result in affording additional protection.

Considerable discussion has been had as to whether or not Rule 94, which relates to flagging should be made more

definite, particularly that part of it which relates to the use of the red signal. As it now stands, it permits the use of judgment by the employee, and as will appear hereafter, a failure to intelligently apply this rule may have been a factor in causing the collision here being considered. This rule is the result of careful consideration extending over a period of years by men familiar with railroad operation, and it may be that it is not capable of improvement. But it is evident from the evidence herein that either this rule is not definite and specific so as to enable an employee to adhere strictly to it, or else the instructions of the Pacific Electric employees under this rule were such as did not result in a clear understanding. We found that various interpretations were given to this rule, ranging from the declaration that it was the duty of a motorman to come to a full stop at a red flag, to the declaration by others engaged in the operation of this road that a motorman should proceed slowly on approaching a flag, could pick it up and proceed to the place where a stop was compelled. In any event, this rule as it stands includes directions as to the use of a yellow and a red flag, which may result in confusing the employee, and a separation should be made so that the red and the yellow flag are dealt with separately. Furthermore, the title of this section is misleading. It is "Slow Speed Signals" and seems to convey the idea of slow speed, exclusive of a stop.

The above examples are given by way of illustration of the need of a revision of these rules, and it should not be understood that they are the only respects in which the rules should be changed.

We recommend that the Pacific Electric Railway Company prepare and present for the approval of the Commission a revision of its rules and regulations.

(B) Discipline. This includes the instructions, training, examining and testing of employees. We find that as to all four of these important matters, the practice of this company was such as failed to insure reasonable competence. Taking Forster, who was the motorman on the train which collided with the standing train, as an example, and his case is typical of the other trainmen involved in this collision, we find that his application was accepted in the latter part of May, 1913. On the day after his application was accepted, he was given instructions by the superintendent, mostly about signals and flagging, for about an hour and a half, and one or two days after these instructions by the superintendent, he was put upon the Hollywood-Laurel Canyon run as a student, and he operated on cars as a student motorman for about three weeks, with some interruption for instructions in equipment. During this student period, however, he was put in independent charge of a car as motorman for two days with no other motorman to assist him. He testifies, however, that during one of these days there was a conductor of two years' experience on his car. At the end of the three weeks' student period, he was given about three hours, or three and a half hours of instruction on the rules contained in the Book of Rules, and three or four days after the end of this student period of three weeks, he was put upon a single car as a motorman. This was about the 24th of June, 1913, and he worked as a motorman on one and two car trains up to the morning of the day of the accident, when he was placed in charge of a three car train, this being the train which collided with the standing train.

Other trainmen testify that in taking their written examination they were allowed to take the examination papers home and have full access to the Book of Rules in preparing their answers to the questions asked. This clearly renders such an examination of no value, and while the testimony is that

in addition to this written examination, an oral examination was given, there is no record of this oral examination and it cannot be determined whether or not it was of real value.

A thorough written examination given under circumstances which develop the student's understanding, or lack of it, of the rules, would be of service, not only as a test of the student, but it would constitute a permanent record which would be of value to the examiner in strengthening the student, by proper instruction in those matters wherein his examination shows him to be weak.

As has been heretofore stated, the training and instructing of Motorman Forster was found to be typical of the training and examining of the other trainmen operating the cars involved in the collision, and it is apparent that in order to qualify men to properly and safely operate high speed electric trains, operating as frequently as the trains on the Pacific Electric system are operated, a very much more thorough course of instruction and training is necessary.

Aside from any general conclusion on this subject, the actions of the men operating the trains involved in the collision, which will be more fully discussed hereafter, clearly indicate a lack of thorough knowledge of the rules and a training sufficient to enable them to promptly put such rules into effect.

The employees of this railway system should be given adequate instructions in the rules governing the operation of trains and should be trained in the actual operation of trains for a longer period than has heretofore been required. Furthermore, a real examination should be given these men to develop their knowledge and understanding of the rules and train operation and from time to time all of the employees operating trains should be called in and given instructions and examination as to these matters, and they should be tested from time to time to develop any weakness in their understanding of the

application of the rules under which they operate. Under no circumstance should men be put in independent charge of trains, either as motormen or conductors, during their student days. Furthermore, it appears that with one exception, all of the men who operated the standing train and the train which collided with it, were men of comparatively little experience, and every effort should be made on each train to intersperse the more experienced men with men of less experience in the operation of trains, thus avoiding what occurred in the matter of this collision, where a train was found to be wholly in charge of comparatively inexperienced men.

Officials of the Pacific Electric Railway have taken steps to remedy some of the abovementioned defects. Among other things, an examiner has been appointed, who will devote himself entirely to the instructing and examining of employees.

We recommend that this company be required to prepare and submit for the approval of the Commission a complete and comprehensive plan for the thorough instructing, training, examining and testing of employees.

(C) Signal Appliances.

1. Road Crossings. The great frequency of accidents resulting from pedestrians and vehicles getting on the track at the crossing of a highway with a railway shows the need of safeguarding these crossings. Obviously, the best safeguard would be to separate these crossings so that the highway would go over or under the railway track, thus entirely preventing the pedestrian or vehicle from getting on the track. However, separating grades is costly, and in the state of California where large areas are comparatively thinly populated and where railroads have pioneered by extending their lines into territory which does not produce large amounts of business for the railroads, it would be impossible from a financial standpoint to

compel the railroads to at once separate all crossings now at grade. No estimates can be made of the cost of so separating existing grade crossings, but there is no doubt that such cost would amount into the millions, and these millions would be greatly added to if all crossings now and hereafter to be made were compelled to be separated. In fact, if a rule is now adopted preventing the crossing at grade of highways by railroads and railroads by highways, except such crossings be separated, this rule would undoubtedly result in preventing, for a long time to come, the construction of railroads into new and sparsely settled territory, and the opening of necessary highways across existing railroads to satisfy the needs of new communities. However, that this problem must be given serious consideration is evident and where existing crossings are unsafe and where the train operation is so frequent as to practically nullify the effect of warning signals, such crossings should be at once separated.

It has been the practice of the Commission to order the installation of danger signals at all crossings at grade, for which application was made, except in such cases where it could be shown that such signals were not needed, as for instance, where all trains were stopped before reaching the crossing and flagged across.

As to crossings at grade established prior to the jurisdiction of this Commission, we recommend that the Pacific Electric Railway Company prepare and submit to this Commission a full and complete statement setting out the location of all crossings of the road of this system by highways, stating in each instance whether the crossing is at grade, and if so, what, if any, protection by way of signal device, or otherwise, is furnished at such crossings.

2. Interlocking Appliances. The crossing of the main line tracks of a railroad by other main line tracks, creates

a very dangerous situation, which experience shows can be best safeguarded by the installation of a modern interlocking device, and we find that every such crossing should be so protected. Therefore, we recommend that Pacific Electric Railway prepare and present to this Commission a full and complete statement showing in each instance, the location of such crossings, the interlocking device installed, if any, and in addition, that said company prepare and submit for the approval of this Commission a complete diagram showing the location and type, together with the estimates of cost of interlocking plants at each of said crossings which are not now protected by such interlocking plants.

3. Automatic Signals. Experience has shown that the best and most efficient device for safeguarding train operation yet devised, is the automatic block signal system, whereby the road is divided into blocks and each block is marked with a signal so constructed that before running into any block, the trainman can tell by looking at a signal whether or not there is a train ahead in that block. In practice there has been very little failure of these signals to work and if the trainman observes them there is little probability of collision. These signals also warn against broken rails and other accidents to the roadbed which result in a breaking of the circuit of electric current, such as an open switch, etc.

In single track operation where the train movement is not heavy, it may be that the staff signal system is sufficient.

We believe that ultimately the entire system of the Pacific Electric Railway outside of city limits should be safeguarded with the block signal system, but before ordering the complete installation of such signals, the Commission should be on information of the approximate cost, in order that it may intelligently determine whether these signals should be ordered

in at once, having in view the financial burden thus imposed, or whether the railway company should more properly be ordered to progressively install such a system, say so many miles per year. The spacing of these signals will be a large factor in the cost, and in order to intelligently consider this matter, we recommend that the Pacific Electric Railway Company prepare and submit to this Commission, complete diagrams, plans and estimates showing the location, type and spacing of a block signal system for the entire main line trackage, together with an estimate of the cost thereof.

In the meantime, the Pacific Electric Railway Company has volunteered to block signal its Venice Short Line, the line on which this collision occurred, and the Pasadena Short Line, outside of the city limits in both instances, and work is now proceeding on such installation.

Causes of the Accident. In considering the cause of the collision which occurred on the Venice Short Line of the Pacific Electric, near the station of Vineyard on the evening of July 13, at about 9:20 P.M., we will follow the trains involved in this collision, because we believe that the contributing causes of this accident were both the failure to act in accordance with the rules, and also the failure to intelligently apply the rules to the circumstances surrounding this collision.

Two electric trains of three cars each, were standing at Vineyard Junction where they had been stopped by a broken trolley wire. A third three-car train approaching from the west met a flagman with a red lantern 300 feet west of the standing trains, and this moving train stopped, picked up this flagman, who informed Motorman Lee R. Clarke, in charge of the moving train that there was a blockade ahead. Clarke then took his train to the place where the other two trains were

standing came to a stop, and then whistled out his flagman.

The rule covering Clarke's duty under these circumstances is found in the first clause of section 150:

"When a train stops or is delayed under circumstances in which it may be overtaken by another train, the conductor or flagman must go back immediately with stop signals a sufficient distance to insure full protection."

Clarke was informed of the blockade ahead by the flagman whom he picked up, and he must have known if he was at all familiar with the operation of the road over which he was running, that he was being followed by other trains. Clearly then, under the rule above quoted, he did stop or was delayed under circumstances which must have made it clear to him that his train might be overtaken by another train, and it was unquestionably Clarke's duty when he picked up this flagman, to immediately whistle out his own flagmen to protect the rear of his train. Had this been done, the flagman, Bartholomai, would have gone back at least 300 feet farther than he did, thus giving Forster warning of danger and an opportunity to stop 300 feet farther from the standing train than he was given such warning. This might have prevented the collision.

Clarke, after picking up the flagman, proceeded slowly up to the two standing trains, came to a stop and whistled out his flagman, Bartholomai, who testifies that he started west from the end of his train immediately upon hearing the whistle with a red and white lantern, fuses and torpedoes. He testifies that he ran part of the distance when he became aware of the headlight of an approaching train and that he got 800 or 900 feet back of the end of his train at the time he was passed by the oncoming train. He stated that he was familiar with the rule requiring the placing of a torpedo at 500 feet, but states that he disregarded this rule because he believed it safer to continue on and

get back as far as possible from his train in order to sooner give warning to the approaching train.

Rule 150 provides:

"Should a train be seen or heard approaching before flagman has reached the required distance, he must at once place one torpedo on the rail, and if by night or during foggy or stormy weather, display a red fusee, continuing in the direction of the approaching train."

Asked why he did not obey this rule, Bartholomai testified that to stop and place a torpedo at 500 feet would take a minute, thus reducing the distance he could get back with his red lantern. But in view of the testimony that he had about three minutes within which to get back from the end of his train after it stopped, it is clear that he had ample time to place a torpedo, which by the way, can be done by simply reaching down and by one movement clamping it on the track. Furthermore, he offers no justification whatever for not lighting a fusee which is a powerful signal, giving off a bright red glare that may be seen for great distances. He could have lit a fusee while walking.

Bartholomai's testimony that he was 800 or 900 feet from the rear of his train when passed by the oncoming train, must be received with caution. If the testimony of Motorman Forster is to be believed at all, that his power was off and he made a service application on passing the flagman, if he had been back the distance claimed by Bartholomai, Forster's train would have come to a stop a considerable distance before colliding with the standing train.

Either Bartholomai did not go back the 800 or 900 feet he testifies to, by reason of a failure to promptly start back when his train stopped and he was whistled out, or else he did get back that distance and failed to obey the rule to place a torpedo and light a fusee immediately when he saw the oncoming train and realized that he could not get back the required distance.

In either event, Bartholomai clearly failed to obey the rules

or intelligently apply them.

Motorman Forster, running the train which collided with the standing train, approached Vineyard Junction, turned his power off and whistled for the junction, and shortly thereafter observed the red lantern held by flagman, Bartholomai.

He testifies that immediately upon observing the lantern he reached for his whistle cord, blew two blasts in acknowledgement of the signal and then made a full service application of his air brake. This did not stop his train and he collided with the standing train at a speed of between 15 and 25 miles an hour. In the first place tests have shown that Forster must have had in plain sight one red tail light and several white lights of the standing train at a distance of at least 700 feet, and regardless of any failure to place signals to warn him he should have seen these lights. Had he done so and immediately applied his brakes with the emergency or full service application, he probably would have avoided this collision.

By test, a train such as Forster controlled, was stopped within 425 feet with full service application, and within 400 feet with an emergency application.

Forster admits he saw the red lantern in Bartholomai's hand, but does not know at what distance. He testifies that he did not make an emergency application of the air because he thought he had sufficient time to make a safe stop.

He violated rule 94 which reads:

"If a danger signal (red flag by day and in addition red light by night) is seen, train will be brought to full stop and will not proceed until such signal is removed by proper person."

Instead of concluding that he had safe stopping distance beyond the flag, he should under this rule have used every effort to bring his train to a stop immediately upon seeing the flag.

From the foregoing, it will appear that the three princi-

pal actors in the matter of this collision, to-wit:

Motorman Clarke, Flagman Bartholomai and Motorman Forster, each contributed to the cause of this collision either by a violation of the rules of operation or by a failure to intelligently apply such rules, and while we are reluctant to place the blame for the resulting tragedy, we feel it our duty to say that this collision resulted from the incompetence of these trainmen, the underlying cause of which incompetence appears to be the insufficient instruction, training and examination given these men by officials of the company.

We submit herewith the following form of order:

O R D E R

This Commission having made its order for an investigation on its own initiative into methods and equipment of the Pacific Electric Railway Company, and said company having been duly notified to appear at a hearing in said matter, and said company having duly appeared at said hearing, and it having been agreed by stipulation that there should be added to this matter a consideration of the crossings of highways with said railway company, and the proper safeguarding thereof, and said hearing having been duly held and this Commission being fully advised in the premises,

IT IS HEREBY FOUND AS A FACT that the methods and practices of the Pacific Electric Railway Company in the instructing, training/^{examining} and testing of its employees is insufficient and inadequate and such methods and practices do not provide competent employees for the safe operation of said Pacific Electric Railway Company's trains, and

IT IS HEREBY FURTHER FOUND AS A FACT that the operation of the railway system of the Pacific Electric Railway Company is not provided with sufficient, adequate and safe signaling devices, and basing its order upon the above findings of fact and the further

findings contained in the foregoing opinion,

IT IS HEREBY ORDERED that the Pacific Electric Railway Company submit for the approval of this Commission within sixty days from the date of this order the following:

A comprehensive and complete plan for the instructing, training, examining and testing of its employees, and within a like period submit for the approval a complete and comprehensive diagram and plan of an automatic block signal and staff signal system, covering its entire system outside of city limits, including the location, type and estimates of cost of such signaling system.

A complete statement showing the location of all crossings of its tracks by roads or highways; whether such crossings are at grade or are separated; what, if any, protection or warning is provided at such crossings.

A complete statement showing the location of crossings of main line tracks by other main line tracks, the protection against collisions which now exists at such crossing, together with estimates of the cost of installing at all such crossings adequate interlocking plants in compliance with this Commission's General Order No. 33;

PROVIDED FURTHER that this proceeding will remain open for the rendering of further orders in the premises.

The foregoing opinion and order are hereby approved and ordered filed as the opinion and order of the Railroad Commission of the State of California.

Dated at San Francisco, California, this 15th day of August, 1913.

H. L. Toland

W. G. Gordon

Wm. T. Truitt

Edwin O. Edgerton

Commissioners.