

4. The Danger Signal must be kept exhibited at all the Fixed Signals, except when it is necessary to lower or turn them off for a train to pass.

5. Unless the Signaller, Foreman, or Shunter, as the case may be, is satisfied that the Line is clear throughout, no Train must follow another Train on the same Line within five minutes. If any Train should arrive five minutes, and less than ten minutes, after the passing of the previous Train, the Signaller, Foreman, or Shunter, as the case may be, may after having brought the Train to a stand and verbally warned the Engine-driver of the time of the passing of the preceding Train, allow it to proceed, the Home Signal being lowered and a Green Caution Signal shewn to the Engine-driver by Flag or Lamp held steadily in the hand.

Copies of this Report were sent to the Company on the 3rd July.

NORTH BRITISH RAILWAY.

Board of Trade (Railway Department),
8, Richmond Terrace, Whitehall, London, S.W.

23rd June, 1913.

SIR,

I HAVE the honour to report for the information of the Board of Trade, in compliance with the Order of the 22nd April, the result of my inquiry into the cause of the collision between two light engines, which occurred, about 5.1 p.m. on the 10th April, near Waverley East Junction, Edinburgh, on the North British Railway.

In this case the first engine was standing at the down home signals awaiting permission to proceed, when the second engine was authorized to enter the same section and struck it. Both drivers were injured, one of them seriously, and a goods guard, who was riding on the footplate of the second engine was also badly knocked about.

The first engine (No. 395) had four coupled wheels, with a leading bogie and six-wheeled tender. The second (No. 825) was a tank engine with six coupled wheels. Both locomotives were dual fitted with vacuum and Westinghouse brake equipment, working blocks upon the coupled wheels, and, in the first-named case, upon the wheels of the tender.

A list of damage is given in the Appendix.

Description.

This collision took place inside, and at the west end of Calton South Tunnel, which is situated between Waverley East Junction and Abbeyhill Junction signal-boxes.

These signal-boxes are separated by a distance of 1,056 yards, and there are four lines of way between them, which have a general direction of east and west. The northern pair is known as the North Main, and the southern as the South Main. In each case the northern line of each pair is used for up (or eastbound) traffic, and the southern for down traffic. The down line of the South Main road is concerned in this case.

Waverley East controls the east end of Waverley Station, and Abbeyhill the junction of the main (double) line to Berwick, and the branch (double) line to Leith.

Measured from Waverley East Junction signal-box the distances to the under-mentioned places, signals, &c., are approximately as follows:—

West end of Calton South Tunnel—south main road	...	162 yards East.
Point of collision	183 " "
East end of Calton South Tunnel—south main road	...	550 " "
Down (South) starting signal—Abbeyhill Junction	}	616 " "
Down (South) distant signals—Waverley East		
Abbeyhill Junction signal-box	1,056 " "
Abbeyhill Junction down (Berwick) home signals...	...	1,132 " "
Ditto do. do. distant do.	...	1,710 " "

The gradient on the down Berwick and down South main lines rises continuously at an inclination of 1 in 78, and the alignment between the two signal-boxes is straight.

The down home (South) signals for Waverley East are placed on a bridge about 10 yards outside the western end of Calton Tunnel, and there is a repeating ground signal about 3 feet inside the mouth of the tunnel. The fixed point for trains to stop at, when the home signals are at danger, is at this repeating signal.

Evidence.

William Black, signalman, Abbeyhill Junction, states: I am 41 years of age and have been in the Company's service for 24 years. I have been a signalman for 20 years, and have been 15 years in Abbeyhill Junction signal-box. On the 10th April I took duty in the box at 2 p.m. to work for eight hours. At 4.54 p.m. I was offered on the down main line a passenger light engine on the block from St. Margaret's signal-box. The 2.38 p.m. passenger train from Hawick was offered by me and accepted by Waverley East at 4.53. It was signalled out of section from Waverley at 4.55 p.m. and I then offered the light engine to the signalman there who at once accepted it. I gave the driver of the light engine a clear road, having lowered all signals including the down distant. The engine passed my cabin at 4.57, when I gave the "Train entering section" signal to Waverley East. I then cleared the engine back to St. Margaret's. I was then offered the Edinburgh goods engine, namely, at 4.57 p.m. The times were entered in the book by train register boy Andrew Gilland. I am quite sure that both the distant and home signals were turned to danger after the passing of the first light engine at 4.57 and before the goods engine was offered me. My fixed signals remained at danger until the goods engine was within about 150 yards of the home signal. When about to lower that signal I received the "Attention" bell on the down south block instrument from Waverley East. I then lowered the home signal to let the engine forward to the starting signal. I then acknowledged the "Attention" bell, and received from Waverley East the "out of section" signal for the first engine at 4.59 p.m. I immediately offered the Edinburgh goods engine and it was accepted at once. The bell signal is 2 pause 3 bells for a light engine. There is track-circuit work for a distance of about 100 yards in rear of my down starting signal, and an indicator showing when the track is occupied and an audible buzzer. But there is no interlocking between the track circuit and the down home signal. I am quite certain that I replaced the down starting signal to danger after the first light engine had passed it. I have an assistant in the signal-box, and it was my business to watch the train or engine past the down starting signal and replace the levers. Nos. 8, 7 and 6 levers work the starting, home and distant signals, and I would have noticed that No. 8 had not been replaced when I lowered No. 7 for the second light engine, if it was standing over in the frame. I then lowered the down starting signal for the goods engine, closed the home signal, and cleared the engine back to St. Margaret's at 4.59 p.m. I gave the "Entering section" signal to Waverley East immediately after the engine was accepted and before I lowered the down starting signal. I personally worked all the fixed signals in connection with both engines. I turned all the signals to danger after the passenger engine passed, and only lowered the home when the goods engine approached it. It is not correct to say that when the goods engine emerged from the short tunnel at St. Margaret's all my down signals were standing clear, because I did not lower the home signal until after the engine had passed the distant. I am satisfied that the signals were in good working order, the electrical repeater for the down distant showed it was standing at danger. I accepted a third light engine from St. Margaret's en route to Haymarket at 5.2 p.m., and was told there was a passenger train behind it. So I telephoned to Waverley East asking if the second light engine was getting in. This was at 5.3 p.m. The signalman replied that the goods light engine

had collided with the passenger engine standing in the tunnel. He added that the second engine had not been put into block, or words to that effect. The third engine was kept at the starting signal until the arrival of the breakdown train and was coupled thereto. The breakdown train with this engine coupled on in front left for Waverley Station at 5.28 p.m. running through the north tunnel. The 4.18 p.m. Outer Circle suburban passenger train was offered and accepted on the up south block from Waverley East at 4.58 p.m. before I received the "Out of section" signal for the first light engine, and there could be therefore no misunderstanding on my part as to the bell signals in connection with the second engine. The suburban train was coming out of Calton Tunnel to my up home signal at 4.59 just after the first engine was cleared back from Waverley East and the second engine accepted. I thought I accepted the goods engine from St. Margaret's but am not sure.

Andrew Gilland, train register boy, Abbeyhill Junction, states: I am 18 years of age and have been in the Company's service for three and a half years. The whole of that time I have been train register boy in Abbeyhill Junction box with the exception of nine months during which time I was at Haymarket Central signal-box. On the 10th April I went on duty at Abbeyhill Junction at 2 p.m. I have eight hours duty. My duties are to enter the block bell signals in the train register book as they are exchanged by the signalmen with the other signal-boxes. I never interfere with the bell or dial signals. I am thoroughly familiar with the code of bell signals used in signalling trains on the block telegraph instruments. I became aware about 5.2 p.m. that a collision had taken place at Edinburgh between the goods engine and the passenger engine, when I heard signalman Black asking Waverley East on the telephone if the goods engine was getting in. Signalman Black asked Waverley East this because he had another engine coming on from St. Margaret's. I cannot explain why the figure for the passenger engine "4.53" in the "Is line clear" column was altered to 4.54. It is my alteration, and I suppose it was the correction of a clerical error. Certain figures in the "Train leaving" and "Train out of section" columns on the opposite page for the up trains were altered because I had misread the clock. I make a point of entering the bell signals given and received at the time they are exchanged. I never keep them in my mind for any length of time to note down afterwards. I am quite clear that all the figures in the book indicating the block signals in connection with the engines referred to are correct. I do sometimes, but not often, watch the working of the fixed signals. I was watching them on this afternoon. I can state that the signals which had been drawn for the passenger engine were put to danger after that engine had passed and that they were not off for the second (goods) engine until it was near to the home signal, when the signalman lowered that signal. I am quite positive that the fixed signals were not standing off when the goods engine left St. Margaret's. I have had no conversation with either signalman Black or assistant signalman Mackay as to what evidence I should give. A train from Leith Central was signalled on the down north road to Waverley East at 4.56: it was accepted at the same time. It was put in section to Waverley East at 4.59. It was cleared back at 5.3 p.m. There was no train signalled on the up north line between 4.11 p.m. and 5.2 p.m., these being the entering section

signals. There are no light engine bell signals entered between 4.15 p.m. and 5.15 p.m. on any but the down south road.

William Mackay, assistant signalman, Abbeyhill Junction, states: I am 28 years of age, and have been 14 years in the Company's service, and have served as signalman eight years in Abbeyhill Junction. I am quite familiar with the working at Abbeyhill Junction, and know all the block signalling regulations and the working of the fixed signals. I, personally, accepted the passenger engine and believe I also accepted the goods engine from St. Margaret's when they were offered, after which the further signalling was performed by signalman Black as I had to go down stairs. I was not in the signal-box when the goods engine passed, or when the "out of section" for the passenger engine was received. When I was leaving the cabin to go I heard the "Attention" bell from Waverley East. I cannot speak further as to what passed in connection with the clearing back of the first engine, nor of the signalling of the goods engine. There is a difference in the sound of the two bells, for the north and south roads respectively, and the single "attention" call I heard was on the deeper-toned, or south bell. I saw signalman Black pull off all the fixed signals for the passenger light engine. I also saw him put them to danger after that engine passed. I am quite clear that signalman Black restored all signals to danger when the passenger engine passed, and also that the fixed signals were not drawn for a second engine before I left the cabin. I cannot say whether the "Attention" bell received from the south down line from Waverley East was for the purpose of clearing back the passenger engine or for offering on the 1.18 up suburban train. The latter train had not been signalled on the block before I left the box. When I returned from the lavatory to the box signalman Black was in the act of asking Waverley East whether the goods engine was getting into the station. It was then I became aware of the accident. I heard Black say something to the effect that the Waverley signalman had made the statement on the telephone that he had not cleared back the first engine. I heard Black turn to the train register boy and say "He did clear back the first engine, didn't he?" and the boy said "Yes." I was on the same shift with signalman Black on the two following days, but this week I am on a different shift of duty. I have had no conversation with him in regard to the accident beyond informing him what I had heard as to the condition of the injured men. I was passing the east end of the lever frame to go out of the box, and noticed that there were no levers at that end drawn over as I passed. Nos. 6, 7 and 8 are at the east end of the frame. I cannot be absolutely certain that I accepted the goods engine from St. Margaret's.

George Reid, signalman, Waverley East, states: I am 49 years of age and have been in the Company's service for 25 years, 23 years as signalman. I have been in Waverley East since 1892. I took on the passenger engine from Abbeyhill Junction at 4.55 p.m. At 4.57 my assistant signalman received the "Entering section" signal and turned the block instrument to "Train on line." The south down home signal was against the driver and he stopped at it. I could just see the front of the engine standing in the mouth of the tunnel. The engine was intended to work the 5.33 p.m. train to Polton from No. 6 platform, but it had to be stopped for a minute or two as the lines which it had to cross had been set for other trains. It is booked as arriving at the mouth of the tunnel at

4.59 p.m. The "out of section" signal is not given for a train or engine until it has passed my signal-box. The "Train out of section" signal for the Polton engine was only given after the damaged engines had been removed and the line had been cleared at 5.40 p.m. This is the time entered in the train book. I am quite certain that the passenger engine was not cleared back to Abbeyhill Junction before the time mentioned. About 5 p.m. the engine seemed to be suddenly pushed forward out of the tunnel, and thereafter I ascertained a collision had taken place. I, personally, heard no noise, nor could I see very well, owing to smoke in the tunnel, what had actually happened. The second engine came on from Abbeyhill Junction without my permission, and either the signalman at Abbeyhill Junction allowed it to proceed before it was accepted on the block, or the driver passed through the signals there at danger. There are no entries in my train book regarding the second (goods) engine. The "Is line clear" signal for the Outer Circle suburban train was given at 4.59 p.m., and "Train entering section" at the same time. The bells for these signals would be 3 pause 1. For clearing a light engine the bell signal is 2 pause 1. The suburban train was offered by assistant signalman Nolan. I am quite certain that when the suburban train was offered on to Abbeyhill Junction no confusion took place on our part, and there was no possibility of the "Train out of section" being given at the same time for the passenger engine. It was only after the suburban train had passed out of the station into the South tunnel that I noticed the first engine at the down home signal. I am not clear whether the driver of the passenger engine whistled after arrival at the home signal. Although I could not see it I assumed it was the passenger engine for the Polton train, because it usually follows the Hawick passenger train from St. Margaret's. It is the general practice to record that a train has arrived when it reaches the home signal, even if it is detained there. In such cases a separate entry is made in the book for the time of "train passing." There is no indicator in the signal-box showing when a train is standing in the tunnel which may possibly be out of view. I remember about 5.2 p.m. the signalman from Abbeyhill spoke to me on the telephone and asked if the goods engine was getting in. I said the passenger engine was here and that there was something on the top of it. Neither I nor the Abbeyhill signalman said anything further.

Robert Emslie, assistant signalman, Waverley East, states: I am 40 years of age and have been in the Company's service for 21 years. I have been about 15 years in Waverley East signal box. Signalman Reid accepted the passenger engine on the block from Abbeyhill Junction. The engine arrived at 4.59 at the down home signal. I was engaged in pulling the up advance starter for the suburban train. It was stopped there as we were not prepared to cross it to the north side of the station. The engine was not cleared back to Abbeyhill Junction until 5.40 p.m., after the collision, of this I am quite certain. I was watching Nolan putting the suburban train on block, and had been watching him for some little time previous. My attention was called about 5 p.m. to the fact that a collision had occurred. I fix this time by the fact that a shunter went down after we had heard of the collision and came back to tell us the up road was clear in sufficient time to allow us to start the 5.2 p.m. train to time. The goods engine which had struck the passenger engine should not have been allowed to leave Abbeyhill Junction, and either the signalman

allowed the goods engine to proceed before it was accepted by us, or the driver must have over-run the signals at Abbeyhill Junction. The Outer Circle suburban train was passing out about the same time as the Polton engine arrived.

James Nolan, assistant signalman, Waverley East, states: I am 25 years of age, and have been in the Company's service for 10 years. I have been five years a signalman, and have worked all the time at Waverley East. Signalman Reid accepted the "is line clear" signal for the passenger engine from Abbeyhill Junction. The engine arrived at 4.59 at the down home signal, and was stopped there as it had to be crossed to the north side of the station to work the 5.33 p.m. train to Polton. I saw the passenger engine arrive at the home signal after I had called "attention," and before I had offered the 4.18 p.m. Outer Circle suburban train on the block to Abbeyhill Junction. I, personally, gave the block signals for the suburban train. The train register boy was sitting down having his tea about this time, and I was doing his work for him. All the entries between about 4.50 p.m. and 5.5 p.m. are mine. I also accepted the "train entering section" signal for the passenger engine at 4.57. I am quite certain that the "train out of section" signal for the passenger engine was never given to Abbeyhill Junction till 5.40 p.m., after the damaged engines had been cleared away and the line reopened for traffic. It would probably have fallen to me to send the "out of section" signal as I was nearest the block bell, as I stood writing up the register book. I pinned the block instrument to "train on line" for the passenger engine. The irregularity whereby the goods engine followed the passenger engine must have occurred at Abbeyhill Junction, either through the signalman allowing the engine to proceed before it had been accepted on the block, or the driver running through the signals. In the latter case we should have heard of it from the signalman. Drivers are not in the practice of passing the down home signal and "call on arm" if at danger. I have noted a case or two of this kind but on each occasion the driver explained he could not quite realise his position owing to the smoke in the tunnel.

Edward Smith, fireman on engine No. 395, states: I am 27 years of age and have been in the Company's service for seven years, six of them as fireman. On the 10th April I was fireman on engine No. 395, a four-wheels-coupled bogie express passenger engine of the West Highland type. The driver was James Mitchell, and we left St. Margaret's Locomotive Depot about 4.55 p.m. for Waverley Station, running tender first, to work the 5.33 p.m. passenger train, Edinburgh to Polton. We had clear signals all the way until approaching the west end of the tunnel, when I noticed that the down home signal at the end of the tunnel was against us. We came to a stand about two yards outside the home signal, which is on the face of the tunnel arch. The engine was never thereafter moved until run into by No. 825 which had followed us through the tunnel. Our engine was badly damaged and my driver severely injured. I escaped with a slight shaking up. I cannot remember whether, during the two minutes or less we stood, my driver whistled to remind the signalman of our position. The tunnel was full of smoke and we approached the down home signal cautiously until we could see its position. When looking over the side of the engine cab I heard the noise of another engine. I first thought it might be in the North tunnel, but immediately it occurred to me that

the noise seemed too distinct for that, and on looking behind I saw the buffer beam of an engine emerge from the smoke about two engine lengths behind. I told my driver to give our engine steam forward, and he had just got it on the move when the collision occurred. My hand brake was applied at the time, but not the engine brake. The second engine was running pretty smart considering that the tunnel was not clear of smoke, at all events at our end. I don't think that the engine could have stopped at the home signal.

John Fraser, fireman on engine No. 825, states: I am 24 years of age, and have been in the Company's service for four years, three years as a fireman. I have been working on the main line between Portobello and Edinburgh for about 14 months and know the road and signals well. On the 10th April I was fireman on engine No. 825, a six-wheels-coupled goods tank engine, Alexander Smith being the driver, and we left Portobello for Edinburgh, for relief purposes at about 4.50 p.m., running engine first, after having worked the 3.45 p.m. goods train from Edinburgh to Portobello. The driver and I commenced duty that day at 4.50 a.m. to work a 12 hours' shift. We had been on duty 12 hours 10 minutes when the collision occurred. We are ordinarily relieved at Edinburgh at 4.50 p.m. We ran out of Portobello yard on to the down main line, and got clear signals until approaching St. Margaret's, when we found the distant and home signals against us. We pulled up and waited at the home signal from three to four minutes. After leaving St. Margaret's we got clear signals for Abbeyhill Junction including distant, home and starting signals, but the Waverley East down distant signal was at danger. The Calton tunnel was filled with smoke which prevented my seeing the position of the home signal for Waverley East. We were running at the usual speed and the driver reduced it when we got into the smoke in the tunnel. When approaching the west end of the tunnel I saw the other locomotive only about an engine length ahead. My driver immediately shut off steam and applied his brake, but it was impossible to pull up before colliding. The engine was badly damaged and the driver was seriously hurt about the head and face. The goods guard, who was travelling on the engine, was also seriously injured. Owing to a broken gauge glass causing an escape of steam, I could not see exactly how the driver got his injuries, but I am of opinion that the injuries were caused by his head coming in contact with the gauge glass and its protector which were thereby broken. I escaped with very slight injury and was not incapacitated for duty. I called assistance for the driver, who was immediately removed in an ambulance to the infirmary. I cannot say whether if there had been no other engine in the way my driver could have stopped short of the home signal. In any case he would not have overrun it by much distance. The goods guard was on our engine because I understand he would not be able to finish his day at the proper time if he had travelled by a passenger train from Portobello to Edinburgh. It is not often that goods guards travel on the engine. I did not hear the driver ask the guard whether he had a pass allowing him to ride on the engine. The driver and goods guard were having no conversation when passing Abbeyhill Junction, or at any point on the journey from Portobello to Edinburgh. I know the fixed signals on that part of the line thoroughly. I am quite sure that when we emerged from the short tunnel at St. Margaret's the Abbeyhill down

distant signal was in the "clear" position, and that the home and starting signals were "off" when they came into view. I also observed that the Waverley East down distant signal at the east end of the tunnel was at danger. We had no hand signal or any communication from the signalman at Abbeyhill Junction whilst passing. The driver did not shut off steam, or apply the brake, after passing out of the tunnel at St. Margaret's.

James Mitchell, driver, states: I have 26 years' service with the Company, and have been driving for 15 years. I came on duty on the 10th April at 4.30 p.m. The usual time to book off is 2.30 a.m. I came off duty the previous day at 2.30 a.m. I was driving engine No. 395, a four-wheels-coupled passenger engine, with a bogie in front, and six-wheeled tender. The engine was dual fitted with vacuum and Westinghouse brakes working blocks on the four coupled wheels and the six wheels of the tender. I was travelling from St. Margaret's Depot into Waverley Station. All the signals at Abbeyhill Junction were clear for me when I passed them. The distant signals for Waverley East were at danger. The tunnel was full of steam and smoke, and we were close up against the home signals for Waverley East before we saw them. The speed at the time would not have been much more than five miles an hour. We have to reduce the speed very considerably when the tunnel is full of smoke on account of the difficulty in seeing these home signals. We

stopped at 4.59 p.m. at the signal. I looked at my watch. The collision occurred at 5.1 p.m. I was knocked down by the force of the collision, so that there might have been some little delay between the time of the collision and the time I looked at my watch. It is possible therefore that I was not standing as long as two minutes at the signal before the collision took place. I think it would certainly have occupied two minutes running from Abbeyhill Junction signal-box to the west end of Calton Tunnel. We actually came to a stand at the signals for Waverley East at the moment when the suburban train entered the tunnel. I did not notice the light engine that collided with us, and cannot speak as to the speed at which it was running. My fireman noticed there was a light engine coming behind us and cried to me to "look out." The engine brakes were released at the moment the collision took place, and my engine was moved forward about an engine length by the shock.

Thomas Dymock, inspector, states: I arrived at the site of the collision about 5.17 or 5.18 p.m. Neither of the engines had been moved at that time. The cab of the tank engine was directly opposite the masonry face of the tunnel. So far as my knowledge goes, the leading pair of wheels were standing on the facing points or thereabouts. The repeating signal for the home signals is just inside the tunnel mouth. The engines were buffer-locked.

Evidence taken on the 20th June.

Alexander Smith, engine driver, states: I am 62 years of age and have been in the Company's service 52 years, 35 of these as an engine driver. I know the line and signals well between Portobello and Edinburgh. My hours of duty on the 10th April were from 4.50 a.m. until 4.50 p.m. On the 10th April I was driver of engine No. 825, a six-wheels-coupled goods tank engine, and worked the 3.45 p.m. goods train from Edinburgh to Portobello. We left Portobello for Edinburgh for relief purposes with the light engine at about 4.50 p.m., running chimney first. I had been on duty 12 hours before leaving Portobello for Edinburgh. My regular shift is 12 hours for five days of the week with a clear day off each week. I cannot clearly recollect whether we passed from the yard at Portobello on to the main passenger line or the goods line. On approaching St. Margaret's I found the home and advance signals against us, and we stopped there for about two minutes. After leaving St. Margaret's the fireman, who rides on the right of the foot-plate, called my attention to the fact that the distant signal for Abbeyhill south road was off, and I personally saw that this was the case. As we approached the home and starting signals at Abbeyhill Junction I observed that they were also off giving us a clear road. I could see the home signal when I was within 120 yards of the post. The starting signal, south road, is visible from the signal-box. I am perfectly certain that the Abbeyhill south road distant signal was standing at clear before I passed it. My speed was about 10 miles an hour passing Abbeyhill signal-box. The Calton tunnel was full of smoke. Halfway through the tunnel we passed the 4.18 p.m. suburban passenger train for Leith Central. I entered the tunnel at a speed of about eight miles an hour with slight steam. The atmosphere cleared slightly just before the suburban train passed us. I then shut off steam because the atmosphere became much thicker, and my speed was reduced so much that, to prevent stopping altogether, I gave a little more steam. I reduced

speed again, and thinking we were going rather slow I gave steam again without, however, materially increasing the speed. My fireman suddenly called that there was something in the way at the end of the tunnel. So I at once shut off steam and was in the act of applying the brake when the collision took place. I was severely injured about the head and face and was in the Royal Infirmary for four weeks. I am still attending there as an out patient and am unable for duty. Goods guard George Gair was travelling on the engine; he did so in order to get sooner home after finishing for the day at Portobello. He had not a pass to ride on the engine. He was not talking to me. We got no hand signal or any sign from the signalman when passing Abbeyhill cabin. Our speed when we struck the other engine was about four miles an hour. I had my engine sufficiently under control to enable me to stop at Waverley East down home signal if necessary.

George Gair, goods guard, states: I am 57 years of age and have been in the Company's service about 40 years; a goods guard and shunter 25 years. On the 10th April I worked the 3.45 p.m. goods train from Edinburgh to Portobello, where I finished my day's work after having been on duty 10 hours. I travelled on locomotive No. 825, which ran light from Portobello to Edinburgh, because it would have made my day longer if I had waited for a passenger train. I do not remember clearly on to what line the engine passed from Portobello yard. I was standing with my back to the coal bunker right opposite the fire-box, and cannot speak as to the position of the fixed signals on the way from Portobello except that, after stopping at St. Margaret's from three to four minutes, when starting away I heard the fireman say to the driver that the Abbeyhill distant signal was off; I did not myself see the position of the signal. I did not hear what the driver said in reply nor did I observe the

position of the home and starting signals at Abbeyhill Junction. The Calton Tunnel was full of smoke. I did not hear the fireman say anything to the driver in regard to something being in the way, when we approached the west end of the tunnel. I cannot say whether the driver made any attempt to stop the engine before the collision took place. I have no idea of the speed at which the engine was running through the tunnel, but it was not going fast. I am, however, of the opinion that the driver had his engine under sufficient control to enable him to stop

within two engine lengths, if there had been nothing in the way and the home signal had been against him. I was severely injured on the head and more or less bruised. I was in the Royal Infirmary for four days, and after recovering resumed duty on the 26th May. As I understand that the goods engine was found about three quarters of an engine length past the disc signal, after the collision, I don't think that the driver could have stopped at that signal. I was not talking to the engine driver or fireman, or distracting their attention in any way.

Conclusion.

This collision was undoubtedly caused by a mistake or misunderstanding on the part of the signalmen at one or other of the two signal-boxes—Waverley East Junction and Abbeyhill Junction. But the men's statements on the main point at issue are so contradictory that the evidence is insufficient to prove which of them were at fault.

The first (passenger) light engine was duly "offered" from Abbeyhill Junction, accepted by Waverley East, and signalled as "entering section." The times—4.55 p.m. and 4.57 p.m.—for these bell signals are identical in the train register books in the two signal-boxes. The engine, moreover, is booked as having arrived at the west end of Calton Tunnel (Waverley East) at 4.59 p.m.

Reid, the signalman in charge at Waverley East, states that the out of section, or clearance bell signal for a train or engine is never given until the vehicles have passed his post. The time entered in his register for the clearance of the passenger engine is 5.40 p.m. after the damaged engines had been removed. He declares that about 5 p.m., one minute after the first engine arrived at the home signal at the west end of Calton Tunnel, he saw the locomotive suddenly pushed forward out of the tunnel, and soon afterwards ascertained that a collision had taken place. Reid affirms that the second (goods) light engine came on from Abbeyhill Junction without his permission—that the passenger engine was never cleared back, and that the goods engine was never offered to him from Abbeyhill or accepted by him.

His statement is confirmed in all particulars by assistant signalmen Emslie and Nolan. The latter during the temporary absence of the train register boy was doing his work, and made the entries in the train register. There are no erasures in the figures, and no entries in any of the columns respecting the second engine.

On the other hand, Black, signalman in charge at Abbeyhill Junction, asserts that the first engine was "cleared back" from Waverley East at 4.59 p.m. At this moment the second engine had arrived at his signal-box. He immediately offered it forward, and received immediate acceptance. So he lowered the down starting signal, and belled the second engine as "entering section" at 4.59 p.m. At 5.3 p.m. having a third light engine to despatch to Waverley, he enquired on the telephone if the second engine was getting into the station, and was then informed of the collision.

There is some doubt as to whether Black, or his assistant Mackay, accepted the two light engines from St. Margaret's, the signal-box east of Abbeyhill Junction, but it appears probable that Mackay was attending to the working east of Abbeyhill from St. Margaret's, and Black westwards to Waverley. Mackay states that after accepting the second engine from St. Margaret's and before this engine actually arrived, he had to leave the signal-box. He cannot therefore corroborate Black's statement that the clearance bell signal for the first engine was received. Mackay did not return to the signal-box until 5.3 p.m. when Black was telephoning for information to Waverley East after the collision had occurred. All the entries in the train register were made by train register boy Gilland, who states that all the figures in the book relating to the passage of block signals are correct. These figures show that the second engine was offered to Waverley East and accepted at 4.59 p.m., and that the entering section bell signal was sent at the same time.

The evidence therefore as to where the fault lay is inconclusive. But there are indications which in my mind are sufficient to form an opinion as to what happened. In the first place I found Gilland an unsatisfactory witness. It was difficult to get the lad to give any direct answer. There are a number of corrections in the figures entered in his train book, which, though they do not affect the times given for the two light engines in question, he was unable to explain. The impression left with me was that he was concealing some material facts.

Again, there is confliction in the evidence on the position of the down signals for Abbeyhill Junction, when the second engine passed them. Signalman Black asserts that

his distant signal was at danger, that he did not lower his home signal until the second engine was within 150 yards of his post, and that his starting signal was not lowered until the engine had passed the signal-box. Mackay, his assistant, states that he saw Black put the signals to danger after the first light engine had passed.

Smith, who drove the second engine (No. 825), is equally positive that the Abbeyhill distant signal was not at danger when he approached and passed it. His fireman, Fraser, corroborates this evidence, and goods guard Gair, who was riding on the footplate of No. 825, states that he heard Fraser tell driver Smith that the Abbeyhill distant was "off." In this case the Abbeyhill home and starting signals must also at the same moment have been standing in the "all right" position.

It has also to be noted that assistant-signalman Mackay, who appears to have accepted the second light engine when it was offered from St. Margaret's, had to leave the Abbeyhill signal-box, before the light engine arrived, and cannot therefore speak as to what passed in connection with the clearance of the first engine, or of the signalling of the second.

The evidence of drivers Mitchell and Smith is sufficient to prove how closely the latter was following the former. Mitchell came to a stand at the disc signal at the western mouth of Calton Tunnel just as a suburban train entered the tunnel on the up road. Smith passed this suburban train in the tunnel, about halfway through. The South Calton Tunnel is only 398 yards long, and the second engine was, in accordance with this evidence, only 200 yards behind the first when the latter stopped at the signal.

I have, after careful consideration, formed the opinion that the second light engine followed the first so closely that the signalman in Abbeyhill Junction either failed to replace the signals to danger behind the first engine, before the second arrived and passed them, or became confused between the two engines, and allowed the second to enter the section towards Waverley East Junction without putting it into block. I am satisfied, however, that there was no wilful breach of the regulations.

Smith states that he had his engine (No. 825) sufficiently under control to enable him to have stopped at the down (disc) home signal for Waverley East. But the blow given to the first engine (No. 395) at the time of the collision was sufficient to drive it forward about $1\frac{1}{2}$ engine lengths, and the position No. 825 was found to occupy after the collision was, as described by inspector Dymock, nearly an engine length in front of that signal. This circumstantial evidence is sufficient not only to disprove Smith's estimate of his speed (four miles an hour) at the moment of collision, but to negative the possibility of his being able to stop his engine at the signal in question.

The two signal-boxes concerned in this case are busy centres of traffic. At Waverley East Junction there are 251 working levers, four telephones, two telegraph and four block instruments. The latter deal with the four running lines of road eastward to Abbeyhill Junction. There are four signalmen on duty, who are relieved every eight hours, and two train register lads divide the duty from 6 a.m. until midnight. During the 24 hours preceding this accident 282 running movements of trains or light engines were dealt with on the two up lines to Abbeyhill, and 273 on the down lines from Abbeyhill. In addition, all the shunting movements, which are very numerous, in connection with the working of the east end of Waverley Station, are controlled from this signal-box.

At Abbeyhill Junction there are 41 working levers, two telephones, two telegraph and eight block instruments. Between 6 a.m. and midnight there are two signalmen employed and one train register lad; from midnight to 6 a.m. one signalman and one train register lad.

The two down lines are track circuited for a length of about 100 yards in rear of the Abbeyhill Junction starting signals, and there are a number of mechanical clearance bars on the up lines at the west end of Calton Tunnels to safeguard shunting movements which have to be made into the tunnels. But in view of the difficulties caused by the tunnels, and the heavy nature of the traffic, I strongly recommend the Company to improve the safety conditions by the provision of track circuit work on the four roads through Calton North and South Tunnels, combined with the necessary control of the signals.

I have, &c.,
J. W. PRINGLE,
Major.

The Assistant Secretary,
Railway Department, Board of Trade.

APPENDIX.

PARTICULARS OF DAMAGE TO PLANT.

Engine No. 395.—Front buffer beam and framing damaged.

Engine No. 825.—Front buffers, buffer beam, and footplate angle-iron broken; both framings

badly bent; footplate bent up; Westinghouse hose-pipe and vacuum pipe broken; left cylinder cover and studs in steam-chest cover broken; also right leading spring broken.

Copies of this Report were sent to the Company on the 19th July.

NORTH EASTERN RAILWAY.

Board of Trade (Railway Department),
8, Richmond Terrace,
Whitehall, London, S.W.
29th May, 1913.

Sir,

I have the honour to report for the information of the Board of Trade, in compliance with the Order of the 24th April, the result of my inquiry into the causes of the fatal accident which occurred on the 17th April to Clifford and Violet Hayhurst, at Overton public level crossing near Beningbrough, on the North Eastern Railway.

This crossing is about seven furlongs south of Beningbrough Station on the main line from York to Northallerton.

The roadway, a cart road leading from Overton to Shipton, crosses the railway at an acute angle, and is about ten feet in width.

The railway consists of a single pair of lines running approximately north and south. It was constructed under an old Act of Parliament as the Great North of England Railway, and the crossing is not described on the plans or in the Book of Reference. In a later Act of 1899, the Company obtained powers for widening the railway in this district, and provision was made to divert the roadway and abolish the level crossing by providing a subway—but the powers have not so far been exercised.

The gates provided shut across the roadway on either side of the crossing, but not across the railway; there is also a wicket gate on each side. A gate box is provided containing a ground frame with levers for working the home and distant signals, protecting the crossing in each direction, and the gate locks. These are correctly interlocked. The gate box and gatekeeper's cottage are on the west side of the railway, and as the gate on the east side is 50 yards from the cottage owing to the sharp angle of the crossing, provision is made for working the gate on the east side by a lever, but the gate on the west side is worked by hand. The wicket gates are free.

The railway is quite straight and level for a mile on each side of the crossing, and so an excellent view of approaching trains is afforded to persons using the crossing.

The crossing is in charge of a gatewoman, the wife of a platelayer, who lives in the cottage adjoining the crossing.

From a census made some little time ago the number of trains passing the crossing in 24 hours was 297, and the number of times the crossing gates were opened for carts was 15 per day.

Evidence.

James Patrick, engine driver, states: I have been in the Company's service 25 years, 14 years of which I have been a driver. I came on duty at 10.57 a.m. on the 17th April for 10½ hours. I left duty the previous day about 9.10 p.m. I was working the 3.50 p.m. goods train ex York, and on approaching Overton Crossing the signals were all off. I did not notice anyone at the crossing. We passed the express just when we were approaching Beningbrough Station. My train consisted of 80 waggons and van, six-coupled engine with leading bogie, and six wheeled tender (No. 712), fitted with Westinghouse brakes throughout. We should be

travelling about 21 miles an hour when passing the crossing.

Fred Monkhouse, engine driver, states: I have been in the Company's service 39 years and have been a driver for about 20 years. I came on duty at 7.40 a.m. on the 17th April at York for 10½ hours. I left duty the previous day about 6.30 p.m. I was driver of the 1.41 p.m. express passenger train from Newcastle to York. I remember passing Beningbrough Station but I do not remember seeing anybody at Overton Crossing. I should be running about 60 miles an hour when