



**Department of Transport**  
*An Roinn Iompair*



# **RAILWAY ACCIDENT**

**A Report of the Inquiry into the  
Level Crossing Collision  
that occurred on 16.02.01**

**at**

**Kiltoom Level Crossing  
Westport Line**

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## **Report Summary**

This report is divided into five sections and two appendices.

### **Section 1**

A brief description of the event - On Friday, 16<sup>th</sup> February 2001, the 03.08hrs liner train from Ballina to North Wall collided with the gates at Kiltoom level crossing at approximately 05.15hrs. The entire train passed through the level crossing. There were no reports of injuries. Both level crossing gates were broken. The signalling equipment was undamaged.

### **Section 2**

The Ministerial Warrant and its supporting legislation - On 5<sup>th</sup> February 2002 Minister O'Rourke directed that I carry out an Inquiry into the cause of the railway accident on 16<sup>th</sup> February 2001 at Kiltoom level crossing, Co Roscommon. This direction replaced an earlier direction, dated 20<sup>th</sup> February 2001, to carry out an Inquiry into the same accident. The direction to hold the Inquiry was made under section 7 of the Regulation of Railways Act, 1871. The direction was for an Inquiry, not a more formal Investigation, which is also provided for in the same Act.

### **Section 3**

The Evidence – I engaged in an examination of the people immediately connected to or witnessing the accident, the train involved, the infrastructure involved and train operations.

Section 3.1 reports the evidence of the signalman, the gatekeeper and her husband, the train driver, the train guard, the acting district manager at Galway and the CTC signalman. There is a conflict of evidence between the gatekeepers, (gatekeeper and her husband) and the train driver with regard to the position of the signal protecting the level crossing. Also, no member of management attended at the accident scene and line management made a remote assessment of the train drivers ability to continue on his journey.

Section 3.2 describes the train involved. There is no evidence to suggest that the train, per se, contributed to the cause of the accident.

Section 3.3 describes the infrastructure. Iarnrod Eireann Infrastructure department carried out tests on the signalling equipment after the accident. These tests indicated that there was no problem with the performance of the signal. The examination of the infrastructure also revealed that the distance between the protecting signal and the gate was inadequate for the line speed. The crossing has been resignalled.

Section 3.4 describes train operations which are applicable to this section of track.

**Section 4**

Commentary – A commentary on the issues significant to this inquiry.

**Section 5**

The Recommendations.

**Appendix A and Appendix A1** show speed restrictions between Ballina and Kiltoom.

**Appendix B**

Everybody who supplied information was assured that they would see a draft copy of the report and be invited to make comments, and if I considered them relevant they would be included in the final report. Appendix B details relevant comments and my responses.

## **1. A brief description of the event**

On Friday, 16<sup>th</sup> February 2001, the 03.08hrs liner train from Ballina to North Wall collided with the gates at Kiltoom level crossing at approximately 05.15hrs. The entire train passed through the level crossing. The accident happened during darkness. Weather conditions at the time of the accident were very foggy and freezing. All witnesses described the weather as such. There were no Met Eireann reports for that particular area. The nearest report was for Knock Airport, and conditions there were clear.

There were no reports of injuries. Both gate booms together with the locks, gate lamps, mesh and targets were broken beyond repair. There was no damage to the signalling equipment. The gate heel where the actuating equipment to operate the signal is attached to the gate was undamaged.

The gatekeepers' husband rang the signalman at Knockcroghery to report the accident, the train driver also rang the signalman at Knockcroghery. The signalman at Knockcroghery reported the accident to Central Traffic Control (CTC), Connolly Station, Dublin. The train driver also contacted the CTC signalman from the level crossing telephone.

After a number of phone calls the train driver was authorised to proceed into Athlone by Iarnrod Eireann management.

## **2. Warrant of Appointment and supporting legislation**

On 5<sup>th</sup> February 2002 Minister O'Rourke directed that I carry out an Inquiry into the cause of the railway accident on 16<sup>th</sup> February 2001 at Kiltoom level crossing, Co Roscommon. This direction replaced an earlier direction, dated 20<sup>th</sup> February 2001, to carry out an Inquiry into the same accident. The direction to hold the Inquiry was made under section 7 of the Regulation of Railways Act, 1871. The direction was for an Inquiry, not a more formal investigation, which is also provided for in the same Act.

My powers, once appointed, are granted under section 4 of the Regulation of Railways Act, 1871. These are to:

- enter and inspect any railway and all the stations, works, buildings, offices, stock, plant, and machinery belonging thereto:
- summon any person who is engaged in the management, service, or employment of a company as defined by the Act and examine for the said purpose and may require answers or returns to such inquiries for the said purposes.
- require and enforce the production of all books, papers and documents of a company which I consider important for the said purpose.

In exercising my powers of Inquiry I have endeavoured to adhere to such fair procedures as are appropriate.

Procedural fairness and the rules of natural justice were basic precepts.

### **3. The Evidence**

The train was the 03:08hrs. liner – freight train – from Ballina to North Wall travelling through Manulla Junction, Claremorris, Castlerea, Roscommon, Athlone and then on to North Wall. The train was operated by a driver and guard; train crew were due to change at Athlone. Kiltoom level crossing is situated between Knockcroghery and Athlone. The crossing is a gated crossing where the gates are normally closed across the railway. The gates are operated by a level crossing keeper when trains need to traverse the crossing.

#### **Plan for Compiling the Evidence. To Engage in An Examination of:**

##### **3.1 The people involved**

The staff immediately connected to or witnessing the accident; the train driver, the train guard, the gatekeeper and the signaller. Other parties with a direct influence on events e.g. management at Galway and personnel with expert knowledge on equipment and infrastructure.

##### **3.2 The train involved**

Locomotive, carriages, including train running times.

##### **3.3 The infrastructure**

Track, line speed, signalling including performance, the level crossing.

##### **3.4 Train operations**

Train drivers, signallers gatekeepers and monitoring of same.

## **3.1 The People Involved**

### **Methodology**

As accident investigation is about fact finding as a means of determining cause, so that further accidents might be prevented my preferred system was to conduct interviews with the parties, with a stenographer. I proceeded in this manner with three of the people directly involved, the fourth (the train guard) did not attend and I subsequently learned that he was ill and had been hospitalised.

Each of these four people supplied written statements in advance of their interviews.

I decided that, in the interests of clear uncontrived statements that I would conduct these interviews without any representation, either for the inquiry or the participants. SIPTU – the Services, Industrial, Professional, and Technical Union – and the train driver acquiesced in that decision (although they both initially requested representation), but the training section of Iarnrod Eireann, without any prior notice to the inquiry, arrived at their appointed time with a solicitor and barrister. Because others had been denied representation, and in the interest of consistency and fairness, I adjourned the inquiry and resolved to keep it confined to people with expert knowledge; I determined upon another method of gathering data.

Rather than contemplate a test in the High Court which would merely consume resources needlessly, and as this inquiry is likely to be the last under current legislation, I resolved to proceed by correspondence with the other parties. As each of these had secondary involvement and were essentially experts of different aspects, correspondence proved to be a more clinical method of data gathering than verbal exchange might have been.

Everybody who supplied information was assured that they would see a draft copy of the report, and be invited to make comments, and if I considered them relevant they would be included in the final report. Those who made verbal contributions in the presence of the stenographer were assured that they would receive full copies of their statements.

In addition to the methods described above I also decided I would do a cab-ride from Ballina to Athlone and this took place on 15<sup>th</sup> February 2002. During this cab-ride it was very foggy, it was difficult to see the signals until almost at them.

### **3.1.1 Evidence of Signalman and Gatekeeper (refer also to 3.4.1 and 3.4.2)**

The signalman stated in his evidence that he forgot to ring the gatekeeper at Kiltoom level crossing to advise of the approaching liner train. The gatekeeper confirmed that no call had been received.

Neither did the signalman implement Iarnrod Eireann rule G3.4 which states that when there is fog or falling snow and the signalman has failed to contact a level crossing, no



train must be allowed into the section until the driver has been verbally warned of the circumstances.

It would be reasonable for the driver in such circumstances to assume that the gatekeeper had been contacted and expect the gates to be open for the train. But, the train driver must also exercise due care and obey signals in all circumstances.

The gatekeeper estimated that after the incident the train stopped nearly at the other signal i.e. the signal on the Dublin side of the level crossing.

The gatekeeper also stated in evidence that after the passing of the down - Dublin to Ballina - liner she knew that the signal had gone back safely to the 'on' position. *(In the context of the signals for Kiltoom level crossing the 'on' position means that the gates are closed across the railway and that the train driver must prepare to stop short of the gates. If the signals were in the 'off' position it would mean that the gates were open across the railway for the train to proceed).* This was at approximately 01:15hrs. The gatekeeper's husband operated the gates for the up "Guinness" liner which went through at approximately 02:30 hrs. He stated in his written statement that he checked the position of both signals after the train had passed by observing the 'tell tale' lights and he knew that they had gone back to the 'on' position. *(The 'tell tale' lights verify the position of the signal during darkness, fog or falling snow).* The next train to pass through the crossing was the train involved in the accident. After the collision took place the gatekeeper's husband stated that he checked the position of the up distant signal. He stated that the signal was in the horizontal 'on' position.

### **3.1.2 Training and Briefing of Signaller and Gatekeeper**

The signaller stated in his evidence that he was satisfied with the training he had received, including refresher training. Details were provided by Iarnrod Eireann on training of signallers. The signaller was in date with regard to training in rules and regulations including refresher courses. The gatekeeper also felt that training had been adequate.

I am satisfied that comprehensive training programmes exist and are implemented.

### **3.1.3 Hours Worked by Signaller**

Details were provided by Iarnrod Eireann of the hours worked by the signaller in the two week period up to the accident. The four shifts just before the accident shift were night shifts of average duration of 8hrs. 50mins. The previous ten shifts were daytime shifts with an average duration of 6hrs. 30mins. The signaller worked fourteen shifts in the two week period up to and including the day of the accident, totalling 100hrs. 40mins.

### **3.1.4 Evidence of the Train Driver**

The driver stated in evidence that as he approached Kiltoom level crossing he had the train speed reduced to about 35 miles an hour to allow for conditions. He stated that he

saw the signal in the downward position i.e. the proceed position, and started to increase his speed up to the line speed of 50 miles an hour. As he came around the left-hand curve and the gates came into view he saw them across the railway. He made an emergency brake application and blew the horn.

When he came to a stop he estimated the front of the train could have been approximately 350 yards (320m) beyond the level crossing, and that when he restarted his train he travelled for a while before he passed the signal on the Dublin side. The total length of the train was 286 metres (loco plus wagons).

The driver stated that he had no problem with the train brake during the journey from Ballina. The heater in the cab of the loco was not working; even though there was freezing fog outside the driver stated that this did not impair his vision.

The driver stated that after the collision he rang the CTC signalman from the level crossing to report the accident.

### **3.1.5 Hours Worked by Train Driver**

In the seven day period up to and including the day of the accident the driver had an annual leave day followed by two rest days. He then worked four night-time shifts, duration – 9:58hrs. 7:53hrs. 8.08hrs. 7.39hrs. Total time worked for seven day period was 33hrs. 38mins. In the previous fourteen day period the driver worked twelve shifts totalling 112hrs. 06mins.

### **3.1.6 Evidence of the Train Guard**

The train guard in his statement said that on approaching Kiltoom level crossing, he was sure that they (he and the driver) had the gate signal to proceed.

### **3.1.7 Evidence of the Acting District Manager Galway**

Through written correspondence the Acting District Manager, Galway advised the inquiry that after the collision took place, he decided to allow the Driver take the train into Athlone Station, following discussions on the telephone with the driver and the CTC signalman.

### **3.1.8 Evidence of CTC Signalman**

Through written correspondence the CTC Signalman advised the inquiry that he was given permission by the Acting District Manager, Galway to inform the driver that he was permitted to proceed into Athlone after the collision.

## 3.2 The Train Involved

The data in this section was obtained from the Chief Mechanical Engineer(CME), Manager Intercity and Iarnrod Eireann publications. There were also discussions with the CME's Technical Department and Intercity line management from Athlone and Galway in relation to the Iarnrod Eireann test which was carried out on the train running times.

### 3.2.1 The Train

The train consisted of a locomotive, number 075 and 18 'forty foot' bogie wagons; total train length was 286 meters; total trailing weight was 634 tonnes. The train brake was tested prior to departure and was found to be satisfactory.

#### *Line Speed*

The maximum line speed for the train was 50mph. There were permanent speed restrictions in place on the route; these were listed in the Working Timetable. There were also temporary speed restrictions in place; these were issued through weekly circular notices and also shed notices. See details in Appendix A

The hazler reading was not analysed following the accident. The hazler would have supplied information on the performance of the train, train speed and brake application, for approximately the last 1000 yards (914m) travelled.

#### *Stopping distance*

Iarnrod Eireann advised with regard to stopping distances for the liner train, see table below. This measurement takes into account all relevant factors including speed, track gradient, train type and braking performance.

|   |           |
|---|-----------|
| Stopping distance of liner train at 50mph from signal.                | 777metres |
| Stopping distance of liner train at 50mph from signal sighting point. | 761metres |

Iarnrod Eireann also advised with regard to stopping distances for a Mark 3 passenger train at 70 mph, see table below. The Mark 3 passenger train regularly uses this route.

|  |           |
|--|-----------|
| Stopping distance of Mark 3 passenger train at 70 mph, from signal.                | 928metres |
| Stopping distance of Mark 3 passenger train at 70 mph, from signal sighting point. | 913metres |

### *Train maintenance*

The locomotive received its routine examination two days before the incident on 14<sup>th</sup> February 2001. The 18 wagons were in date for their General Repair. Two wagons, 30230 and 30245 were overdue 6 monthly D examination by 11 weeks. The train was loaded later that afternoon and examined prior to departure and no defects were observed.

### *Examination of train after the accident*

The train was examined immediately after the accident by the train crew and there was no damage found; the train including the brakes and speedometer was examined by Iarnrod Eireann maintenance staff in North Wall on the morning after the accident and was found to be in proper working order.

### **3.2.2 Train Running Times**

Iarnrod Eireann advise that train path times listed in the working timetable are calculated by a computerised train simulation package taking into account permanent speed restrictions, track gradient, station locations and train type data. Using this package the train that was involved in the accident is scheduled to take two hours and sixteen minutes to travel between Ballina and Knockcroghery and eight minutes to travel between Knockcroghery and Kiltoom.

Around the time of the accident major relaying works were in progress on the line between Athlone and Claremorris. There were temporary speed restrictions in place, which were issued through weekly circular notices and shed notices. See details in Appendix A. This would have increased further the running time.

Below is listed the running time for the train involved in the accident. The times are taken from the signal cabin records. It must be pointed out that the signal cabin clocks are not synchronised. Each cabin has its own clock. Therefore, there could be a margin of error in the information listed below.

|                              | Ballina | Manulla J. | Claremorris | Castlerea | Roscom<br>mon | Knockcro<br>ghery | Kiltoom |
|------------------------------|---------|------------|-------------|-----------|---------------|-------------------|---------|
| Time                         | 02:59   | 03:31      | 03:49       | 04:29     | 04:58         | 05:06             | 05:15   |
| Running<br>time -<br>minutes |         | 32         | 18          | 40        | 29            | 8                 | 9       |
| Total time<br>- minutes      |         |            | 50          | 90        | 119           | 127               | 136     |

Running times for train on 16<sup>th</sup> February 2001.

As part of their own investigation Iarnrod Eireann carried out a test with a similar type of train and ran between Ballina and Kiltoom on 8<sup>th</sup> March 2001. They used the same

locomotive, 075, and eighteen bogie wagons, estimated trailing weight 641 tonnes. Below are listed the running times of the test train which ran on the 8<sup>th</sup> March.

|                              | Ballina | Manulla J. | Claremorris | Castlerea | Roscom<br>mon | Knockcro<br>ghery | Kiltoom |
|------------------------------|---------|------------|-------------|-----------|---------------|-------------------|---------|
| Time                         | 02:43   | 03:15      | 03:36       | 04:27     | 04:55         | 05:03             | 05:11   |
| Running<br>time -<br>minutes |         | 32         | 21          | 51        | 28            | 8                 | 8       |
| Total time<br>- minutes      |         |            | 53          | 104       | 132           | 140               | 148     |

Running times for train on 8<sup>th</sup> March 2001.

Some of the temporary speed restrictions were different on the 8<sup>th</sup> March, see Appendix A.

The greatest variance is through the Claremorris/Castlerea section; the test train took 51 minutes, the train involved in the accident took 40 minutes, a difference of 11 minutes. On request Iarnrod Eireann carried out calculations using their simulator on what the time difference should be, taking into account the different speed restrictions which were in place on each night. The results were that the test train registered a two minute shorter running time between 120mls. 1320 yds. and 112mls. 880yds. This implies that the train involved in the accident took 13 minutes less to travel between Claremorris and Castlerea; a margin of error could exist due to the individual signal cabin clocks.

### **3.2.3 Where the train came to a stop**

The Chief Mechanical Engineer's department of Iarnrod Eireann advised that the train came to a stop with the rear of the train estimated to be 350/300 yards (320m/275m) passed the level crossing; this information was determined by their own internal investigation. The driver estimated that the front of the train could have been approximately 350 yards (320m) from the level crossing. The train was 286m long. The position of the train was not measured after the accident. The hazler was not removed from the locomotive. Analysis of the hazler would have given the train speed and brake application for approximately the last 1000 yards (914m) travelled. With the information available I am not in a position to say precisely where the train came to a stop.

### **3.3 The Infrastructure**

The data in this section was obtained from the Chief Engineer Infrastructure, the Chief Mechanical Engineer, Iarnrod Eireann publications, my own cab-ride and inspections on the ground. Discussions also took place on the ground with an expert in signalling equipment from the Chief Engineer, Infrastructures' department in relation to the performance of the signalling equipment.

#### **3.3.1 The Track**

At the time of the accident, the track through the level crossing was single line, made up of UIC 54kg rail on concrete sleepers, installed in November 1999. There is a falling gradient towards Athlone, with an average gradient of 1: 482 between the up gate signal and the level crossing gates. Kiltoom level crossing is situated between two curves, the curve radius on the Roscommon side is 3023meters and on the Athlone side is 3057 meters. Travelling in the up direction the curve is a left hand curve.

#### **3.3.2 Line speed**

Allowable line speeds are listed in the working time table which, is issued annually. Temporary speed restrictions are published in the weekly circular and also through shed notices, issued weekly. Issues that are taken into account when setting line speeds include signalling, signal sighting and level crossings.

With regard to the line speed through Kiltoom level crossing, in 1961 the speed was 70 mph and remained until 1978. Between 1978 and 1998 the line speed was 50 mph and from 1999 to present the line speed is 70 mph for passenger trains and 50mph for freight trains. There was a temporary speed restriction put on the level crossing following this accident of 25 mph and this remained in place until June 2001 when new signalling for the level crossing was commissioned.

#### **3.3.3 Signalling**

Signalling between Ballina and Knockcroghery is by the Electric Token Block System (ETS). In this system the signalman has responsibility for ensuring that there is only one train at a time in a section of track known as 'the block', in this instance the distance between two signal boxes. There is a mixture of both semaphore and colour light signals. Signalling between Knockcroghery and Athlone is by the Track Circuit Block System (TCB). In this system the line is fully track circuited in order to prove the absence of trains. The section is controlled by Central Traffic Control (CTC) in Connolly Station, Dublin. The signals for Kiltoom level crossing were the only semaphore signals in the Knockcroghery/Athlone CTC section.

### 3.3.4 Kiltoom Level Crossing

Kiltoom level crossing is located at 83 mls. 1730 yds. between Knockcroghery (90mls) and Athlone (78mls. 440yds) on the Westport to Athlone line. The crossing is a CX type which means the gates are normally closed across the railway and the public road is open for road traffic. C type level crossings have gates normally closed across the public road.

### 3.3.5 Signalling of CX type Level Crossings

Iarnrod Eireann were unable to unearth earlier(1960's) signalling design standards for CX type level crossings. Line speed was the same as at the time of this accident. No new C or CX type level crossings have been installed in recent years. Level crossings are however re-designated from C to CX where it is considered more conducive to public safety. The re-designation is initiated by Iarnrod Eireann and approved by the Railway Inspectorate in the Department of Transport. There is a recent company strategy for re-signalling C and CX type level crossings as resources permit. This will be a stop signal at an appropriate overlap distance from each crossing and a distant signal at no less than the service braking distance from the stop signal. The overlap distance, normally 200m, is to allow a margin of error for where the train comes to a stop. The aspect of the signal is interlocked with the position of the gates.

Iarnrod Eireann advise that in current signalling design, sighting distances are not taken into account when deciding signal spacing; braking distance is calculated from the signal.

### 3.3.6 Signalling of Kiltoom level crossing

Kiltoom was a block post up until June 1963 with a signal cabin and home and distant signals; trains would have crossed at Kiltoom. In February 1964 the existing signals protecting Kiltoom level crossing were removed and replaced by up and down distant/caution signals located on the right-hand side of the line and worked from the gate heels; gate heel operation – the opening/closing of the gates causes the signal to go to the off/on position by a wire running from the end of the gate, gate heel, to the signal. The up distant signal was located 540m from the level crossing and the down distant signal was located 556m from the level crossing. See Table 1 below. These signals were semaphore signals.

|   | Up direction of travel | Down direction of travel |
|---|------------------------|--------------------------|
| Distance to gate from signal.                           | 540metres              | 556metres                |
| Distance to gate from signal sighting point, day/night. | 1020/1059metres        | 994/999metres            |
| Stopping distance of liner train at 50mph from signal.  | 777metres              | 697metres                |

|  | Up direction of travel | Down direction of travel |
|--|------------------------|--------------------------|
| Stopping distance of liner train at 50mph from signal sighting point.              | 761metres              | 746metres                |
| Stopping distance of Mark 3 passenger train at 70 mph, from signal.                | 928metres              | 859metres                |
| Stopping distance of Mark 3 passenger train at 70 mph, from signal sighting point. | 913metres              | 892metres                |

Table 1

Diamond grade arms were fitted in 1998. Diamond grade arms provide greater visibility of the signal. There were no aspect repeaters for the signals at the level crossing; aspect repeaters repeat the aspect/position of the signal on a display at the level crossing to assist the level crossing keeper in knowing the position of the signal.

The signals are controlled by the crossing keeper. The signalman gives a verbal communication to the crossing keeper. If the signalman fails to contact the crossing keeper he gives a warning to the train driver. The crossing keeper at Kiltoom level crossing is contacted by the Signalman at Knockcroghery for trains travelling in the up – towards Dublin – direction and by the CTC Signalman for trains travelling in the down – towards Ballina – direction.

Kiltoom level crossing has now been re-signalled with colour light stop and distant signals, which are interlocked with the operation of the gates. The distant signals are sited at service braking distance from the stop signals.

### **3.3.7 The issue of the up distant signal ‘drooping’, (refer to 3.1.1 and 3.1.4).**

There is a conflict of evidence between 3.1.1 and 3.1.4. The gatekeeper stated that he knew the signal had gone back to the ‘on’ position after the passage of the up (*Ballina to Dublin*) Guinness liner, the last train movement before the accident. The driver stated that he saw the signal in the downward ‘off’ proceed position as he approached it. I needed to examine could the signal have been ‘drooping’ i.e. slightly down from horizontal position but not totally in the downward position.

Iarnrod Eireann advised that there were no reports of problems with the up distant signal for Kiltoom in the six month period before the accident. Iarnrod Eireann Infrastructure Department carried out tests on the signalling equipment after the accident. The signal wires were examined for signs of obstructions, which would cause drooping, and none were found. This was done by pulling the signal wire (*the wire from the gate heel to the signal* (3.3.6)) so that the signal moved to the fully off position and slow release of the signal wire caused the signal to restore to the fully on position.



I considered the issue of the signal ‘drooping’ with the breaking of the gates causing the signal to go back to the ‘on’ position. I did this through discussions with Iarnrod Eireann signalling staff and also a demonstration on the ground. The signal drooping would have been caused by an obstruction in the signal wire or the signal wire being too tight. As stated in the previous paragraph no obstruction was found in the signal wire after the collision. If there was an obstruction in the signal wire before the collision both gates would have had to rotate in full sympathy i.e. towards the centre of the road in order to pull the wires sufficiently to release any obstruction, so as to allow the signal restore to the ‘on’ position after the collision. At the time of the collision the gates which were broken did not rotate in sympathy but in the direction of train travel. Therefore, it is not possible that the collision caused the signal restore to the ‘on’ position if it were drooping due to an obstruction in the signal wire. If the signal wire were too tight, after the breaking of the gates it would still be too tight, and the signal would be drooping. When the new gates were put in place, the operation of the signal was tested by operation of the gates and was found to be satisfactory, no adjustment of the signalling equipment, including the signal wire being required. This test was carried out by Iarnrod Eireann Infrastructure department.

### **3.3.8 Mixed signalling**

There is mixed signalling e.g. semaphore and colour light signals on the Iarnrod Eireann network. Ideally a train route should have the same type of signalling over the whole length. It is undesirable to have different types of signals in close proximity of each other or where there is a high density of signals.

Iarnrod Eireann endeavour where practicable to avoid mixed signalling. The issue of mixed signalling is being incorporated into high level signalling standards currently in preparation by Iarnrod Eireann. The signals for Kiltoom level crossing were the only semaphore signals in the Knockcroghery/Athlone CTC section but there was other mixed signalling on the journey from Ballina to Athlone.

### **3.3.9 Risk Assessment**

Iarnrod Eireann carried out a risk assessment of level crossings in 1999. The assessment concentrated on road/rail interfaces and the associated risks. Iarnrod Eireann advise that the type of signalling was not a consideration in determining the risk, as the company rules and procedures for signalmen, drivers and crossing keepers pertaining to the operation of level crossings offered protection.

## **3.4 Train Operations**

The data in this section was obtained from Manager Intercity which included information on training and Iarnrod Eireann publications.

### **3.4.1 The Function of the Signaller at Knockcroghery (in relation to the operation of the crossing)**

Iarnrod Eireann rule G3.1 states that at a level crossing designated 'CX' the signaller must (in the case of a non-stopping train) telephone the crossing keeper when the train is approaching and is due to enter the section in which the level crossing is situated. The signaller must, if he fails to contact the crossing keeper, warn the train driver to approach the level crossing with caution. – rule G3.2. Rule G3.4 states that when there is fog or falling snow and the signaller has failed to contact a level crossing, no train must be allowed into the section until the Driver has been verbally warned of the circumstances. (Rule references are those applicable at the time of the accident)

### **3.4.2 The Function of the Gatekeeper at Kiltoom Level Crossing**

Instructions issued to the gatekeeper at Kiltoom in relation to the operation of the gates include; always keep the gates closed and locked across the railway line except when it is necessary to open them to allow rail traffic to pass; the signaller will telephone when trains are about to approach the crossing. The Gatekeeper must always put the gates across the public road in good time to allow a train to pass; once he has put the gates across the public road he must never put them back across the railway line until the complete train has passed.

### **3.4.3 Train Driving**

Iarnrod Eireann provided details of their driver training programme. Defensive driving and SPAD – Signal Passed at Danger – awareness are core principals of the driver training programme. The information provided on route knowledge learning demonstrates a comprehensive learning programme. Route learning includes geographical information of the route, locations of signals, level crossings, speed restrictions, line curvature, track gradients and type of signalling. Drivers are not assessed as competent until the district traction executive is satisfied that they are ready for assessment. Iarnrod Eireann Safety Standard No. 9 defines the minimum mandatory requirements that must be in place to ensure that drivers are provided with guidance on the methods by which they can achieve and retain competence in route knowledge. This Standard came into effect on 1<sup>st</sup> April 1998. Clause 30 requires that “records must be checked every January and certified for each Driver by his nominated locomotive inspector”.

The train driver involved in the accident was fully trained. He regularly worked trains over the route and confirmed knowledge on 18<sup>th</sup> January 2001. The issue of observance

of signals when they are not visible at the usual distance owing to fog is clearly detailed in the rule book. The driver must reduce speed as necessary.

#### **3.4.4 Monitoring of Drivers and Signalmen.**

Drivers are monitored when signing on duty, a visual inspection that they are fit for work, and they are also monitored in an 'on the job' environment by traction executives. Monitoring also takes place as regards keeping in date for refresher courses, rules examinations, medical examinations and competency certification. Drivers are monitored at line management level by district managers. In July 2001 Iarnrod Eireann introduced a standard on 'Drivers Requiring Special Monitoring'.

Signalmen are also monitored. Iarnrod Eireann advise that signal cabins are visited regularly by line managers. Systems for record keeping as regards refresher courses are in place.

## **4. Commentary**

### **1. Immediate cause of collision.**

The train collided with the gates at Kiltoom because the gates were across the railway; the Gatekeeper had not received a telephone call from the Signalman; the Driver was allowed into the section without a verbal warning even though it was foggy; the Driver avers the signal to be in the off position and expected the gates to be open across the railway.

### **2. Management/Organisational Responses to the Accident**

The Management/Organisational responses to the accident were weak. This was the fourth accident where a train hit the gates at Kiltoom level crossing since 1994. No member of management attended at the accident even though their nearest location was 8 miles away at Athlone. As a result the point at which the train stopped was not measured, the Hazler was not retrieved which could supply information on the last 1000 yards of the trains performance, we don't have definitive information on the position of the signal. To compound the matter from a management perspective line management in Galway made a remote assessment of the Drivers ability to continue on his journey.

### **3. Hours of work**

“An employer shall not permit an employee to work, in each period of seven days, more than an average of 48 hours,” a quote from Section 15 of the Organisation of Working Time Act 1997. This is qualified by the Act which allows the employer to average the working hours over a four month period. The Signalman in the two weeks preceding the accident worked more than 100 hours spread over 14 days. If the pattern of his work was examined for a four month period he may well exceed the legal limit. Irrespective of that he had worked 14 days without a break before the accident, he admits that he forgot to inform the Gatekeeper about the approach of the train, he admits he forgot to implement Rule G3.4. The maintenance of concentration, difficult enough in the middle of the night in lonely isolation, could not be helped by a lack of opportunity for recreation.

Refer also to Appendix B

### **4. Up distant Signal at Kiltoom**

The Driver said that the signal was in the proceed position, this was supported by the Guard. All others (the Gatekeeper and her husband) say it was in the stop position, this was supported by all the engineering evaluations made after the event.

Table 1 gives a distance of 540metres from the up distant signal to Kiltoom level crossing. The stopping distance required for the liner train at 50mph is 777metres.

Given this fact and the other data in Table 1 the distance between the signal and the gates at Kiltoom was inadequate. It is noted that the crossing has been re-signalled.

## **5. The Train**

There is no evidence to suggest that the train, per se, contributed to the cause of the accident.

## **6. Other Infrastructure Issues**

Iarnrod Eireann advised that signalling issues are considered when setting line speed and also that in signalling design sighting distances are not taken into account when deciding signal spacing; braking distance is calculated from the signal. Clearly the line speed through Kiltoom level crossing was too high, both for the liner train and for passenger trains.

With regard to mixed signalling I note that Iarnrod Eireann endeavour to avoid mixed signalling where possible.

## **7. Training of Drivers and Signalmen**

From the information provided by Iarnrod Eireann I am satisfied that processes are in place for persons to acquire in a controlled way, the skills and knowledge necessary for competent train driving. I am also satisfied that adequate training is in place for Signalmen.

## **5 Recommendations**

1. Iarnrod Eireann should carry out a review of signalled level crossings to determine the adequacy of the signalling, and, in particular, braking distances.
2. Iarnrod Eireann are running a nationwide, twenty four hour system. Nothing should happen in the dead of night that would not be tolerated at mid-day. Management procedures should be in place for the full examination of an accident site before either equipment or personnel are moved, with the obvious exception of responding to the need for emergency medical attention.
3. Iarnrod Eireann should ensure that the random monitoring of signalmen is effectively carried out.
4. Newer locomotive models provide the facility for analysing the performance of a train after its journey is complete. This technology should be fitted to older models.

## Appendix A

Showing speed restrictions on 16/2/01, 8/3/01 and the differences.

| Section          |   | From<br>Mls. – Yds. | To<br>Mls. – Yds. | mph 16/2/01 | Difference on 8/3/01 with<br>16/2/01  |
|------------------|---|---------------------|-------------------|-------------|---------------------------------------|
| Ballina/Manulla  | P | 166 - 880           | 160               | 35          | Same                                  |
|                  | T | 160                 | 159               | 25          | Same                                  |
|                  | P | 159                 | 145 -1540         | 35          | Same                                  |
| Manulla/C'morris | L | 145 -1540           | 138               | 50          | Extra 25mph at 144-1320 to<br>143-440 |
| C'morris/C'rea   | P | 138                 | 134 -1540         | 40 * 15     | Extra 25mph at 136 to<br>135-1320     |
|                  | T | 134 -1540           | 124 - 440         | 25          | Same                                  |
|                  | P | 124 - 440           | 123 -1540         | 20          | Same                                  |
|                  | T | 123 -1540           | 121 - 440         | 25          | Same                                  |
|                  | L | 121 - 440           | 120 -1320         | 50          | Same                                  |
|                  | T | 120 -1320           | 120 - 100         | 25          | Same                                  |
|                  | L | 120 - 100           | 118 - 880         | 50          | 1390 yds. shorter                     |
|                  | T | 118 - 880           | 116 - 900         | 25          | Same                                  |
|                  | T | 116 - 900           | 116 - 800         | 5           | 25mph                                 |
|                  | L | 116 - 800           | 114 - 1600        | 50          | 25mph                                 |
|                  | T | 114 -1600           | 114 - 1500        | 5           | 25mph                                 |
|                  | T | 114 -1500           | 112 - 1320        | 25          | Same                                  |
|                  | L | 112 -1320           | 112 - 880         | 50          | 25mph                                 |
| C'rea/Roscomm.   | T | 112 - 880           | 109 - 600         | 25          | Same                                  |
|                  | L | 109 - 600           | 103 - 220         | 50          | Same                                  |
|                  | T | 103 - 220           | 102 - 1100        | 25          | Same                                  |
|                  | L | 102 -1100           | 101 - 1100        | 50          | Same                                  |
|                  | T | 101 -1100           | 101 - 880         | 40          | Same                                  |
|                  | L | 101 - 880           | 100               | 50          | Same                                  |
|                  | T | 100                 | 99                | 25          | Same                                  |
|                  | L | 99                  | 98                | 50          | Same                                  |
|                  | T | 98                  | 96 - 880          | 25          | Same                                  |
| R'comm./Athlone  | P | 96 - 880            | 96 - 440          | 30          | Same                                  |
|                  | P | 96 - 440            | 95 -1540          | 40          | Same                                  |
|                  | L | 95 -1540            | 90 - 220          | 50          | Same                                  |
| Knockcroghery    | P | 90 - 220            | 89 -1540          | 30          | Same                                  |
| Kiltoom 83-1730  | L | 89 -1540            | 83 -1730          | 50          | 470 yds. shorter, 25mph at<br>Kiltoom |

\* 15mph through cross-over on Dublin end of Claremorris.

**L = Line Speed for liner train**

**P = Permanent Speed Restriction**

**T =Temporary Speed Restriction.**

## Appendix A1

Showing speed restrictions on 8/3/01

| Section                 |                       | From<br>Mls. – Yds. | To<br>Mls. – Yds. | mph 8/3   |    |
|-------------------------|-----------------------|---------------------|-------------------|-----------|----|
| <b>Ballina/Manulla</b>  | P                     | 166 - 880           | 160               | 35        |    |
|                         | T                     | 160                 | 159               | 25        |    |
|                         | P                     | 159                 | 145 - 1540        | 35        |    |
|                         | L                     | 145 - 1540          | 144 - 1320        | 50        |    |
| <b>Manulla/C'morris</b> | T                     | 144 - 1320          | 143 - 440         | 25        |    |
|                         | L                     | 143 - 440           | 138               | 50        |    |
|                         | P                     | 138                 | 136               | 40        |    |
|                         | T                     | 136                 | 135 - 1320        | 25        |    |
| <b>C'morris/C'rea</b>   | P                     | 135 - 1320          | 134 - 1540        | 40*15     |    |
|                         | T                     | 134 -1540           | 124 - 440         | 25        |    |
|                         | P                     | 124 - 440           | 123 -1540         | 20        |    |
|                         | T                     | 123 -1540           | 121 - 440         | 25        |    |
|                         | L                     | 121 - 440           | 120 - 1320        | 50        |    |
|                         |                       | 120 - 1320          | 119 - 660         | 25        |    |
|                         | L                     | 119 - 660           | 118 - 1070        | 50        |    |
|                         | T                     | 118 - 1070          | 112 - 880         | 25        |    |
|                         | <b>C'rea/Roscomm.</b> | T                   | 112 - 880         | 109 - 600 | 25 |
|                         |                       | L                   | 109 - 600         | 103 - 220 | 50 |
| T                       |                       | 103 - 220           | 102 -1100         | 25        |    |
| L                       |                       | 102 -1100           | 101 -1100         | 50        |    |
| T                       |                       | 101 -1100           | 101 - 880         | 40        |    |
| L                       |                       | 101 - 880           | 100               | 50        |    |
| T                       |                       | 100                 | 99                | 25        |    |
| L                       |                       | 99                  | 98                | 50        |    |
| T                       |                       | 98                  | 96 - 880          | 25        |    |
| P                       |                       | 96 - 880            | 96 - 440          | 30        |    |
| <b>Knockcroghery</b>    | P                     | 96 - 440            | 95 -1540          | 40        |    |
|                         | L                     | 95 -1540            | 90 - 220          | 50        |    |
|                         | P                     | 90 - 220            | 89 -1540          | 30        |    |
|                         | L                     | 89 -1540            | 84 - 440          | 50        |    |
| <b>Kiltoom 83-1730</b>  | T                     | 84 - 440            | 83 - 1730         | 25        |    |

\* 15mph through cross-over on Dublin end of Claremorris.

**L = Line Speed for liner train**

**P = Permanent Speed Restriction**

**T = Temporary Speed Restriction.**



## Appendix B

As indicated during the Inquiry everybody who supplied information was assured that they would see a draft copy of the report and be invited to make comments, and if I considered them relevant they would be included in the final report. I received comments from the Driver, Manager Human Resources, Iarnrod Eireann and Manager Safety, Iarnrod Eireann. I detail below the comments which I considered relevant to the report.

My rationale for including any observations received is that they serve to correct, elucidate, elaborate or otherwise throw light on matters referred to in the main body of the report.

### Driver

Signal position. See report 3.3.7.

I quote from driver – “I also note that no mention is made of the possible effects of the severe weather conditions – again accepted by all parties – on the signal wire and signal position. It is possible that freezing of the signal wire and attached moisture affected the weighting of the signal leading to it dropping. Indeed I have spoken to gatekeepers who are warned about this phenomenon during training and who have had to adjust the signal wire accordingly. It is also factual to state that nobody witnessed the position of the signal from 02.30hrs. to 5.15hrs. when the incident occurred and that in the prevailing conditions this is the factor most likely to lead to the signal being ‘off’ when the gates were across the line.”

### Response

*The evidence of all parties as regards the position of the up distant signal is included in the report.*

*With regard to severe weather conditions, as described in 3.3.6 the signals at Kiltoom are worked from the gate heels. The closing of the gates across the public road causes the stroke crank to pull the signal to the ‘off’, proceed position. The stroke crank is a lever similar to levers in signal cabins. The stroke crank movement pulls the signal wire by 300mm. The first 200mm of the stroke takes up the slack in the signal wire and the final 100mm pulls off the signal.*

*The thermal coefficient of expansion of the steel wire is 0.000012mm per degree Celsius. The signal was 540metres from the gate; the stroke crank was on the Athlone side of the level crossing. The maximum length of signal wire, from the stroke crank to the signal would have been approximately 540m plus 40m (to allow for crossing the public road and the distance to the gate) i.e. 580m. (by the time this inquiry started the signals had been replaced with colour light signals). A one degree Celsius drop in temperature would cause that length of wire to contract by 6.96mm. In order for the contracting signal wire to pull the signal off it would have to contract by 300mm requiring a temperature drop of 43 deg Celsius. Temperature data received from Met Eireann for*

*Mullingar, the nearest station for recording temperature data, verified a temperature drop of 3.2 deg Celsius on the night of the accident.*

*It is already stated in 3.3.7 that when the new gates were put in place, the operation of the signal was tested by operation of the gates and was found to be satisfactory, no adjustment of the signalling equipment, including the signal wire being required. This test was carried out by Iarnrod Eireann Infrastructure.*

*A signal that is not fully in the 'off' , proceed position, must be treated as 'on'.*

*Signal wires do need to be adjusted for temperature changes and adjusters are built into the wires for that purpose, adjacent to the level crossing gates. But as already explained the temperature would have had to drop by 43 deg. Celsius from the time of closing the gates at 02.30hrs.to when the accident occurred in order for the severe weather conditions to cause the signal to be in the proceed position.*

### **Manager Human Resources**

#### **Hours of Work, both in Commentary and Recommendation 3 of draft report.**

I quote – “I wish to advise that following “New Deal” agreements with staff across Iarnrod Eireann and implemented from June 2000 onwards, with Signalmen covered from October 2001, hours of work are limited to an average 48 hours per week over the roster cycle or a maximum of 13 weeks. In this regard, significant controls are employed under a customised annual hours system which brings limitation on working hours and improved and stable pay for our staff”.

#### **Response**

*In Section 4.3 of the report I comment on hours of work; the hours worked by the Signalman and the Organisation of Working Time Act, 1997. During the Inquiry I requested from Iarnrod Eireann if they had applied for and received any derogation's or exemptions in respect of any category of staff under the 1997 Act. Manager, Human Resources, Iarnrod Eireann confirmed in a letter dated 10<sup>th</sup> September 2002, “ that Iarnrod Eireann has not sought any derogation in regard to the application of the Organisation of Working Time Act, 1997. Iarnrod Eireann is conscious of its responsibility to effect full implementation of the Organisation of Working Time Act provisions no later than August of 2003”*

*I used this information as a basis for my references.*

*Since the draft report was circulated it transpires that there exists a derogation in the form of S.I. No. 20/1998 Exemption of Transport Activities, 1998, from the requirements of the 1997 Act.*

*The responses received from Iarnrod Eireann were accurate; they did not seek the derogation. The records available within the Department of Enterprise, Trade and*

*Employment indicate that the derogation was sought by the “social partners at a national level” and was operational from 1<sup>st</sup> March 1998.*

*The Department of Enterprise, Trade and Employment dealt with a group known as ‘The social partners of the Joint Committee for Railways’ in arranging the derogation, or as described in the documentation, an exemption. The file in this Department which dealt with the exemption notes that the submission from the group – the social partners of the Joint Committee for Railways – was handed into the Department by the Manager Human Resources of Iarnrod Eireann.*

*The response of 10<sup>th</sup> September 2002 and the observations on the draft report from the Human Resource Manager were not helpful to the work of the Inquiry.*

*The relevant consequence of this situation is that Iarnrod Eireann was not bound by the Organisation of Working Time Act when the accident at Kiltoom occurred.*

*Recommendation 3 of the draft report has been deleted.*

### **Manager Safety**

#### **Section 5 Recommendation 4 of draft report, now Recommendation 3..**

I quote - “Signalmen are already monitored on a random and non random basis, with regular cabin visits, refresher courses, annual exams etc. So I think your suggestion that a method should be devised to monitor signalmen on a random basis could be expressed differently.”

#### **Response**

*Recommendation 3 now reads “Iarnrod Eireann should ensure that the random monitoring of signalmen is effectively carried out”.*