# ACCIDENTS AND THE UNDERGROUND

## by Philip James

In the November 2021 edition of *Underground News*, I summarised work on the Railway Work Life and Death Project. A team of volunteers, of whom I am one, are digitising records of workplace accidents that will be available for historical research. Much of the work has focused on reports prepared by the Railway Inspectors and these are now available at –

**www.railwayaccidents.port.ac.uk/the-accidents**

While drafting my earlier article, I only had sight of about a quarter of the reports but now all 20,963 are available, so it is possible to do some analysis of the data. The reports cover the railways of the United Kingdom and Ireland, until partition, from 1900 to 1939 but not the period from 1916 to 1920, probably a delayed impact of World War 1. Reports for other time periods are either not available or have not been retained so this data pool is as complete as it can be.

The Railway Inspectors had a reputation for being thorough in their reporting and this is invariably true of the reports I have seen. The volunteers have necessarily summarised details of each accident so the entries in the project spreadsheet will be less detailed than the original reports. The originals have been digitised to the extent that scanned versions were sent to volunteers to work on so it may be possible to obtain copies if required.

I needed to focus on accidents relevant to Underground lines, including their surface sections. I eventually selected 240 reports where an Underground company is mentioned and another 13 where the Underground is in close proximity and thus might have been a factor. This latter group were all on the London, Tilbury & Southend Railway between Bromley-by-Bow and Upminster. I was able to divide these 253 reports into 35 accidents in deep bored tube lines, 75 accidents in sub-surface lines and 143 on the surface sections of underground lines. I counted cuttings and open-air sections of cut and cover routes as sub-surface lines.

**Table 1** summarises the source material. The Metropolitan and Metropolitan District Railways were responsible for or involved in 169 of the accidents, two thirds of the total. Other London based companies account for 80 accidents and the Glasgow underground for four. Many of the railway company names featured in accident reports reflect joint ownership or operation of lines and I have retained these but note variations in the way they were described in the reports.

I decided to focus on accidents on Underground lines but to exclude locations that were not part of an Underground system at the time of the incident. There are many accidents at locations that have subsequently become part of the London Underground, Overground, Docklands Light Railway or Tramlink, and while of interest, they will not tell us much about safety on Underground lines.

Some accident reports relate to the Isle of Wight but none at locations where former Underground stock was used, so of no interest to this study. Four reports relate to the Glasgow Underground and I included these as apart from cable haulage, they have similar issues to London.

The Underground railways have many features peculiar to their environment. These include, but are not limited to, tunnel operation, electric or cable traction, lift shafts, confined spaces and rolling stock with gates. These may lead to types and frequencies of accident not experienced elsewhere.

Surface sections of underground lines, particularly in days of steam operation would be much like any other railway and therefore not have any unusual accident trends. In places an ‘underground’ line might be adjacent to a surface railway and therefore an incident on one might impact the other. For example, a track worker on a surface line might be at risk from live rails on the adjacent Underground line.

Individual accident reports might say if an underground line is close to the site of an accident involving another company but there are only seven reports where an underground company is mentioned in an accident involving a non-underground company. Underground lines generally feature metro style operation with frequent passenger services and little or no freight so operational factors may influence the type of accidents that occurred.

The project has categorised accidents according to their type, e.g. Shunting, and the injuries caused, e.g. Fractures. It has therefore been possible to say how many accidents on Underground lines and the wider national network fall into each category and to make comparisons. I have also managed to split underground accidents into ‘above ground’, ‘sub surface’ and ‘deep tube’ elements for these comparisons. I have tabulated this information below.

**Table 2** deals with types of accident. Shunting, goods handling and being caught between vehicles are the sort of accidents typically associated with freight. They occurred with a monotonous frequency and similarity in the accident reports. They are more frequent on the national network than on Underground lines. Working trains accounts for a similar proportion of accidents in each environment and accidents on the track are much more frequent on Underground lines. This may have something to do with the constrained environment, frequency of trains and the presence of conductor rails.

The 253 underground accidents are about 1.2% of the total number. To understand whether this is higher or lower than might be expected, it would be necessary to compare the sizes of the respective workforces for the years in question and this data is not available. Similar metrics would be needed for an objective comparison of the various underground companies.

**Table 3** deals with types of injuries. The headline observation is the much higher proportion of fatalities in the underground data set. **Table 6** links accident type and injuries for the Underground. It shows that 70% of the fatalities occurred to persons whilst about the track, again reflecting the distinctive underground environment. Almost half of reported accidents 'while about the track' were fatal.

**Table 7** is a similar composition for the national railways. It also shows a high correlation between fatalities while about the track but not to the same extent as on the underground lines, 54% rather than 70%, and about 44% of reported accidents 'while about the track' were fatal. It becomes clear here that shunting accounted for a lot of the non-fatal injuries.

The reporting process within individual companies and at particular locations may be significant. Fatal accidents and those involving serious injury or dangerous practise would obviously be of interest to the railway inspectors. Incidents resulting in minor injuries might attract less attention. At some point, somebody has to decide that an incident is notifiable otherwise it goes unrecorded and unreported.

Shunting and related accidents often resulted in crush injuries or loss of body parts and these figures are higher for the national rail network. Six accident reports for the national network do not show the nature of the injuries hence a lower total, 20,957 in **Table 3**. These may be omissions during data entry or reflect an accident where nobody was hurt.

**Table 4** shows the breakdown of accident types between the modes of underground operation. An interesting observation is that accidents 'while about the track' are high for surface and sub-surface lines but relatively low for the deep tubes. Perhaps track work in the latter was more likely to require a possession. Also, a deep tube with a single track, by its nature limits the ability of people to access or cross the track.

It is curious that sub-surface lines had a higher proportion of such accidents than surface lines. Perhaps the double track tunnels and open sections made them seem more like a surface line and hence they were treated as such. Also, work on electrification would have been taking place during the early years covered by the accident reports.

By contrast, the deep tubes have more accidents working trains or while on railway property. Railway property would include lift shafts and associated infrastructure, items seldom found on other lines.

**Table 5** breaks down injury types between the different modes of operation. There are differences but they are not great and it is not clear if they are reasons for them. The greater number of accidents above ground and the least number in the deep tube may reflect the relative mileages of each category. During the period in which the accidents occurred, we had a mature railway network above ground. In the suburbs, underground lines would choose to run above ground where this was feasible. A newer and largely subsurface network served central London and a growing but still relatively small tube network was also present.

**Table 8** records the number of underground accidents each year. The greatest concentration is in the period 1904 to 1912, about 43% of the total. The first decade of the 20th century coincided with the electrification of the Metropolitan and District railways and examination of the accident reports suggests that many occurred while about the track on the lines in question and may have been associated with this work.

**Table 9** compares the yearly averages. Note the greatly lower annual averages both nationally and on the underground in the years between the wars. Was this a real reduction or something to do with reporting?

Space precludes further tables but breaking the analysis down by the types of injuries and types of accidents each year, almost all categories show a decline in the inter war period suggesting the overall reduction in accidents per year was real. Fatal accidents and those whilst about the track have not declined to the same extent suggesting but not proving that reporting might have focused to some degree on the most serious accidents. Nationally, accidents were also higher between 1904 and 1912 but not to the same extent as on the Underground.

The project records the gender of the accident victim and almost all are male. Only 2 accidents out of 253 on the Underground featured female victims. This reflects contemporary employment practise. Both of the females were involved in accidents, one fatal, on the Metropolitan Railway at Neasden. Both were crossing or in close proximity to the track. Both were employed as charwomen. They occurred on 7 December 1923 and 5 January 1924.

On the wider national network, 37 accidents involved women. One accident report concerning a derailment during shunting, has no named victim as nobody was hurt. Sadly, no data exists for the period of the First World War when many women were employed on the railways and in other industries. Accidents to men were recorded as late as May 1915 so we might infer that no women were injured during the war up to that time.

Eleven railway inspectors were responsible for preparing the national accident reports and ten of those also prepared reports for underground accidents. Three inspectors, John Hawkesworth Armytage, J.L.M. Moore and John P.S. Main dealt with over 82% of underground accidents, Amos Ford dealing with most of the remainder. Charles Campbell, J.J. Hornby and William Worthy Cooke were also prolific investigators but not for the Underground. J.A. Sinclair, J. Birch and R.H. Williams dealt with relatively few accidents, likewise J.A.A. Pickard who does not feature in any underground accidents.

Between 1904 and 1926, five inspectors were active and the number of accident reports per year was higher during this period. At other times, four inspectors were active. Was this a response to fewer accidents or were the inspectors concentrating their limited resources on the most serious cases? Fellow volunteer, Brian Granger, has done some research on the railway inspectors.

**https://www.railwayaccidents.port.ac.uk/inspecting-the-inspectors/**

The project has now moved on from reports prepared by the Railway Inspectors to those prepared by various Trades Unions representing railway workers. These are primarily concerned with compensation payments and seldom have details of accidents. Digitising these reports is a work in progress so no conclusions can be drawn yet.

Sadly, since my earlier article, I have learned of the death of volunteer coordinator Craig Shaw. This item by our project leader, Dr Mike Esbester, is a better tribute to him than I can provide here.

**https://www.railwayaccidents.port.ac.uk/craig-shaw/**

An enthusiastic contributor to the project, he is greatly missed but ably succeeded by our new volunteer coordinator, Chris Heaton.

| **Table 1 – Railway Company Responsible For Accident Location** | **Number of Accidents Reported** |
|---|---|
| Metropolitan Railway | 63 |
| Aylesbury Joint Station (Metropolitan Railway also involved) | 1 |
| Great Central Railway (Metropolitan Railway also involved) | 1 |
| Great Western and Metropolitan Joint Railway | 3 |
| London and North Eastern and Metropolitan Joint Railway | 9 |
| London and North Eastern Railway (Metropolitan Railway also involved) | 1 |
| Metropolitan and Great Central Joint Railway | 5 |
| Metropolitan and Metropolitan District Joint Railway | 8 |
| Metropolitan District Railway | 59 |
| South Eastern and Chatham Railway (Metropolitan Railway also involved) | 1 |

| Table 1 – Railway Company Responsible For Accident Location (Continued) | Number of Accidents Reported |
|---|---|
| London and South Western Railway (Metropolitan District Railway also involved) | 1 |
| London, Midland and Scottish and Metropolitan District Joint Railway | 2 |
| London, Tilbury and Southend Railway / Midland Railway [London, Tilbury and Southend Section] (Metropolitan District Railway and Underground Electric Railways Co Ltd involved in two accidents. LT&SR in close proximity to District Railway) | 15 |
| Baker Street and Waterloo Railway | 2 |
| Central London Railway | 8 |
| Charing Cross, Euston and Hampstead Railway | 2 |
| City and South London Railway | 8 |
| East London Joint Railway | 1 |
| Great Northern and City Railway | 1 |
| Great Northern, Piccadilly and Brompton Railway | 3 |
| London Electric Railway | 22 |
| London Passenger Transport Board | 33 |
| Glasgow District Subway / Glasgow Subway Railway | 4 |

| Table 2 – Type of accident | Underground Statistics | | National Statistics | |
|---|---|---|---|---|
| Caught between vehicles | 7 | 2.8% | 1,301 | 6.2% |
| Goods handling | 3 | 1.2% | 1,542 | 7.4% |
| Shunting | 22 | 8.7% | 6,701 | 32.0% |
| Whilst about the track | 143 | 56.5% | 6,307 | 30.1% |
| Whilst on railway property | 29 | 11.5% | 1,759 | 8.4% |
| Working trains | 42 | 16.6% | 2,956 | 14.1% |
| Workshops | 7 | 2.8% | 397 | 1.9% |
| **Total:** | **253** | | **20,963** | |

| Table 3 – Nature of casualty | Underground Statistics | | National Statistics | |
|---|---|---|---|---|
| Fatal | 100 | 39.5% | 5,199 | 24.8% |
| Contusions | 30 | 11.9% | 3,911 | 18.7% |
| Crush | 19 | 7.5% | 2,311 | 11.0% |
| Cuts or lacerations | 14 | 5.5% | 1,423 | 6.8% |
| Dislocations | 0 | 0.0% | 132 | 0.6% |
| Fractures | 18 | 7.1% | 1,146 | 5.5% |
| Loss of body parts | 1 | 0.4% | 807 | 3.9% |
| Multiple | 23 | 9.1% | 1,980 | 9.4% |
| Scalds or burns | 8 | 3.2% | 194 | 0.9% |

| Table 3 – Nature of casualty (Continued) | Underground Statistics | | National Statistics | |
|---|---|---|---|---|
| Sprains | 3 | 1.2% | 664 | 3.2% |
| Shock to system | 4 | 1.6% | 114 | 0.5% |
| Other | 33 | 13.0% | 3,076 | 14.7% |
| **Total:** | **253** | | **20,957** | |

| Table 4 – Type of accident | Above Ground | | Sub Surface | | Deep Tube | |
|---|---|---|---|---|---|---|
| Caught between vehicles | 6 | 4.2% | 0 | 0.0% | 1 | 2.9% |
| Goods handling | 2 | 1.4% | 1 | 1.3% | 0 | 0.0% |
| Shunting | 20 | 14.0% | 0 | 0.0% | 2 | 5.7% |
| Whilst about the track | 78 | 54.5% | 58 | 77.3% | 7 | 20.0% |
| Whilst on railway property | 14 | 9.8% | 2 | 2.7% | 13 | 37.1% |
| Working trains | 18 | 12.6% | 14 | 18.7% | 10 | 28.6% |
| Workshops | 5 | 3.5% | 0 | 0.0% | 2 | 5.7% |
| **Total:** | **143** | | **75** | | **35** | |

| Table 5 – Nature of casualty | Above Ground | | Sub Surface | | Deep Tube | |
|---|---|---|---|---|---|---|
| Fatal | 57 | 39.9% | 27 | 36.0% | 16 | 45.7% |
| Contusions | 15 | 10.5% | 11 | 14.7% | 4 | 11.4% |
| Crush | 14 | 9.8% | 0 | 0.0% | 5 | 14.3% |
| Cuts or lacerations | 8 | 5.6% | 5 | 6.7% | 1 | 2.9% |
| Dislocations | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% |
| Fractures | 8 | 5.6% | 9 | 12.0% | 1 | 2.9% |
| Loss of body parts | 1 | 0.7% | 0 | 0.0% | 0 | 0.0% |
| Multiple | 11 | 7.7% | 10 | 13.3% | 2 | 5.7% |
| Scalds or burns | 5 | 3.5% | 3 | 4.0% | 0 | 0.0% |
| Sprains | 2 | 1.4% | 0 | 0.0% | 1 | 2.9% |
| Shock to system | 2 | 1.4% | 2 | 2.7% | 0 | 0.0% |
| Other | 20 | 14.0% | 8 | 10.7% | 5 | 14.3% |
| **Total:** | **143** | | **75** | | **35** | |

| Table 6 – Underground Accident Types v Injury Types | Caught between vehicles | Goods handling | Shunting | Whilst about the track | Whilst on railway property | Working trains | Work-shops | Totals |
|---|---|---|---|---|---|---|---|---|
| **Fatal** | 2 | 1 | 3 | 70 | 11 | 12 | 1 | **100** |
| **Contusions** | 1 | 0 | 4 | 16 | 4 | 4 | 1 | **30** |
| **Crush** | 3 | 0 | 7 | 2 | 2 | 4 | 1 | **19** |
| **Cuts or lacerations** | 1 | 0 | 1 | 7 | 0 | 4 | 1 | **14** |
| **Dislocations** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **Fractures** | 0 | 1 | 1 | 15 | 1 | 0 | 0 | **18** |

| Table 6 – Underground Accident Types v Injury Types (Continued) | Caught between vehicles | Goods handling | Shunting | Whilst about the track | Whilst on railway property | Working trains | Work-shops | Totals |
|---|---|---|---|---|---|---|---|---|
| **Loss of body parts** | 0 | 0 | 1 | 0 | 0 | 0 | 0 | **1** |
| **Multiple** | 0 | 1 | 1 | 12 | 4 | 5 | 0 | **23** |
| **Scalds or burns** | 0 | 0 | 0 | 2 | 1 | 4 | 1 | **8** |
| **Sprains** | 0 | 0 | 1 | 0 | 0 | 1 | 1 | **3** |
| **Shock to system** | 0 | 0 | 0 | 2 | 1 | 1 | 0 | **4** |
| **Other** | 0 | 0 | 3 | 17 | 5 | 7 | 1 | **33** |
| **Totals:** | **7** | **3** | **22** | **143** | **29** | **42** | **7** | **253** |

| Table 7 – National Accident Types v Injury Types | Caught between vehicles | Goods handling | Shunting | Whilst about the track | Whilst on railway property | Working trains | Work-shops | Totals |
|---|---|---|---|---|---|---|---|---|
| **Not Stated** | 1 | 0 | 1 | 1 | 0 | 3 | 0 | **6** |
| **Fatal** | 287 | 174 | 1,033 | 2,797 | 354 | 459 | 95 | **5,199** |
| **Contusions** | 195 | 413 | 1,511 | 794 | 313 | 626 | 59 | **3,911** |
| **Crush** | 406 | 241 | 1,055 | 206 | 147 | 208 | 48 | **2,311** |
| **Cuts or lacerations** | 18 | 85 | 456 | 365 | 148 | 329 | 22 | **1,423** |
| **Dislocations** | 7 | 10 | 50 | 29 | 9 | 24 | 3 | **132** |
| **Fractures** | 64 | 98 | 419 | 280 | 97 | 167 | 21 | **1,146** |
| **Loss of body parts** | 28 | 23 | 298 | 268 | 56 | 123 | 11 | **807** |
| **Multiple** | 88 | 143 | 563 | 619 | 195 | 337 | 35 | **1,980** |
| **Scalds or burns** | 0 | 3 | 9 | 41 | 25 | 84 | 32 | **194** |
| **Sprains** | 1 | 59 | 276 | 121 | 85 | 114 | 8 | **664** |
| **Shock to system** | 2 | 13 | 19 | 39 | 22 | 17 | 2 | **114** |
| **Other** | 204 | 280 | 1,011 | 747 | 308 | 465 | 61 | **3,076** |
| **Totals:** | **1,301** | **1,542** | **6,701** | **6,307** | **1,759** | **2,956** | **397** | **20,963** |

**Table 8 – Frequency of Underground Accidents by Year**

| Year | Frequency | Year | Frequency | Year | Frequency | Year | Frequency |
|---|---|---|---|---|---|---|---|
| 1900 | 2 | 1910 | 7 | 1920 | Not known | 1930 | 13 |
| 1901 | 1 | 1911 | 11 | 1921 | 2 | 1931 | 2 |
| 1902 | 4 | 1912 | 13 | 1922 | 3 | 1932 | 8 |
| 1903 | 7 | 1913 | 5 | 1923 | 5 | 1933 | 5 |
| 1904 | 17 | 1914 | 4 | 1924 | 10 | 1934 | 5 |
| 1905 | 13 | 1915 | 4 | 1925 | 6 | 1935 | 5 |
| 1906 | 13 | 1916 | Not known | 1926 | 5 | 1936 | 4 |
| 1907 | 16 | 1917 | Not known | 1927 | 12 | 1937 | 2 |
| 1908 | 6 | 1918 | Not known | 1928 | 8 | 1938 | 15 |
| 1909 | 14 | 1919 | Not known | 1929 | 3 | 1939 | 3 |

| Table 9 – Average Accidents per Year | Pre-1916 | Post-1920 | 1904 to 1912 |
|---|---|---|---|
| **National** | 747.4 | 473.9 | 872.8 |
| **Underground** | 8.6 | 6.1 | 12.2 |