

# WORK & SAFETY ANALYSIS 2018





# Abstract

The report examines data for employment and incident reports submitted by IRATA members January – December 2017. IRATA membership rose to 389 by Q4, a further increase of 36 members operating worldwide. Total employment rose to 15,530. Associated work hours remained at 18 million hours. There was a significant and welcome increase of employment of L1s by over 1,000. Utilisation fell to 1,171 hours per employee, the lowest for over 5 years.

There were 148 reported events, of which 86 were 'Dangerous Occurrences'. Fatalities, injuries and illnesses accounted for 62, of which 13 were reportable, and, very sadly, including three fatalities. The overall reportable injury rate was 110 per 100,000 workers - well below all latest UK, Eurostat EU28 and USA work injury statistics - maintaining a very good safety record for injuries, though returning to 2010-2013 levels for 'On Rope' working. The fatalities contributed to an increase in the 5-year fatality rate to well above the range of most other related data. This must be a cause of concern for the Association.

Positives include the absence of illnesses brought on by hot/humid conditions and a significant reduction in 'On Rope' errors by technicians.

Areas where improvements in safety could be achieved are identified, were dominated by the need to prevent rope damage and severance. Dropped objects remain a concern, as does site protection and hazard identification, all of which need to be improved.

**Dr C H Robbins**  
**14 July 2018**





Image courtesy of MIRA Rope Access

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Image courtesy of Asaken S.Coop









# 1. Introduction

The Industrial Rope Access Trade Association International (IRATA), formed in 1989, requires members of the Association to regularly submit data on employment, accidents and incidents. This report presents summaries of the data provided during the period January - December 2017.

This report is dedicated to Graham Burnett who, sadly, passed away during his tenure as Chairman of IRATA during 2017 – a great loss to family, friends, IRATA and the rope access community in general.

The report analyses the employment and accident/incident data submitted by member companies. In order to calculate accident rates it is essential to have details of employment levels, as well as accident and incident data. Gratitude is due to those with the onerous task of assembling and submitting the required data, and also to the IRATA staff who assembled and presented the data for analysis. All data was subject to quality checks prior to analysis.

It is important to note that the numbers of employees reported relate to member company employees only. IRATA qualified individuals, who are not employees of members, are not covered by this report.

Throughout the report, reference is made to the following categories of work location:

**‘On Rope’** – Arranging, using and directly involved in rope access work. It also includes access and egress activities to rope access work sites and setting up belays, rigging and de-rigging. Thus, this does not necessarily require a person to be ‘roped up’ or physically connected to active ropes.

**‘Other’** – Typically includes all other work, both on and off-site, in offices and elsewhere that is in support of rope access and related activities. ‘Other’ also includes all hours not accounted for by the above category including rope access trainers (unless actively on rope) and all non-rope access training.

**‘Training’** – Activities undertaken at rope access training facilities and establishments by trainees, including assessment. It excludes all trainers and training staff, reported under either of the above categories. All other training, induction courses, trial work, specialist courses (e.g. use of breathing apparatus, first aid) are excluded, reported under ‘Other’.

Additionally, for the purpose of this report, the distinction is made between:

**‘Accident’** - An unintended event when personal harm, injury or fatality occurs at work. This will include sprains, strains, illnesses or ill health brought on by or made worse by work.

**‘Incident’ or ‘Dangerous Occurrence’** – Any event or situation where no personal harm or injury occurred but which could have led to injury or fatality.

In effect, any situation involving loss of control of a hazard would be reportable under either heading.

The report is arranged with figures, graphs and tables incorporated within the text to which they apply. The report presents conclusions and makes recommendations, based on the data supplied, to raise awareness of specific work issues of relatively high frequency and/or seriousness.

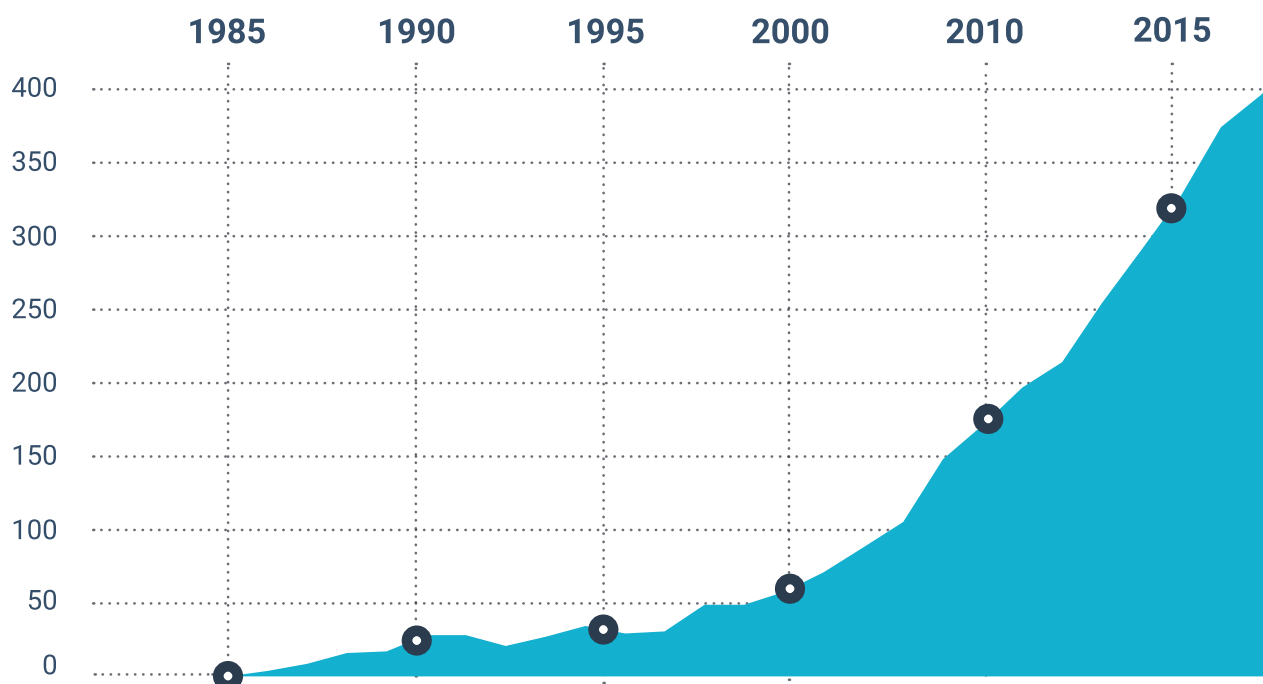




## 2. IRATA Membership

Fig. 1 shows the continued increase in membership of the Association that rose from 353 to 389 by Q4 in 2017. Increases in membership occurred primarily in Australasia (+3), Mediterranean (+7), Middle East, Central Asia & South Asia (MECASA) (+4), North America (+4), South East Asia & Far East (+9). Since 2005, an almost linear increase in membership has been maintained.

**Fig. 1**  
**Membership at Year End**





## 3. Employment Statistics

### 3.1 Employment Levels

Fig. 2 shows average employment figures for 2017 against those from previous years. (Note that the figures are taken as the average of the four quarterly figures submitted for the year). Total employment numbers, including trainers, over the last 5 years were:

2013 - 12,039  
2014 - 11,849  
2015 - 13,223  
2016 - 13,100  
**2017 - 15,530**

Fig. 2 also shows the overall increase in employment was primarily due to increases in all qualified technicians and particularly Level 1s – accounting for over 1,000. This is welcome news for the industry in need of ‘feedstock’ to maintain the increases in L2/3s.

**Fig. 2**  
**Employment by Grade**

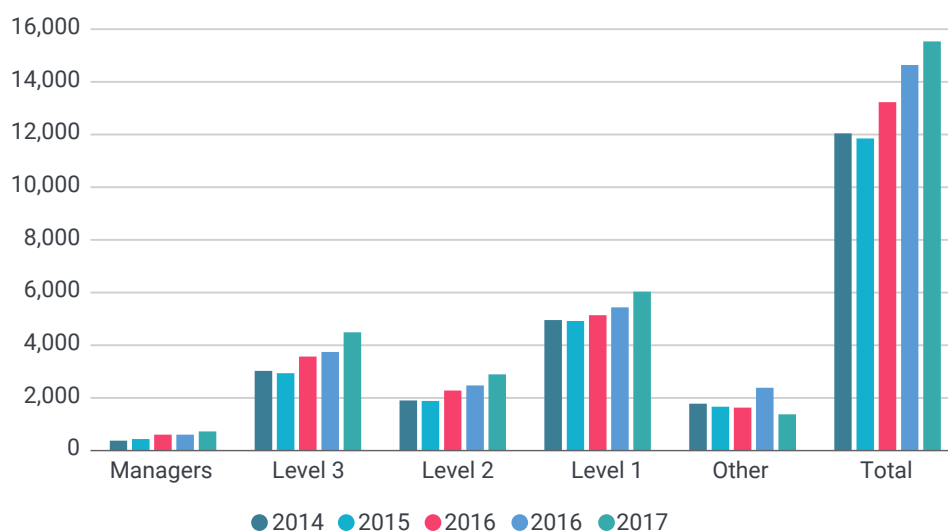
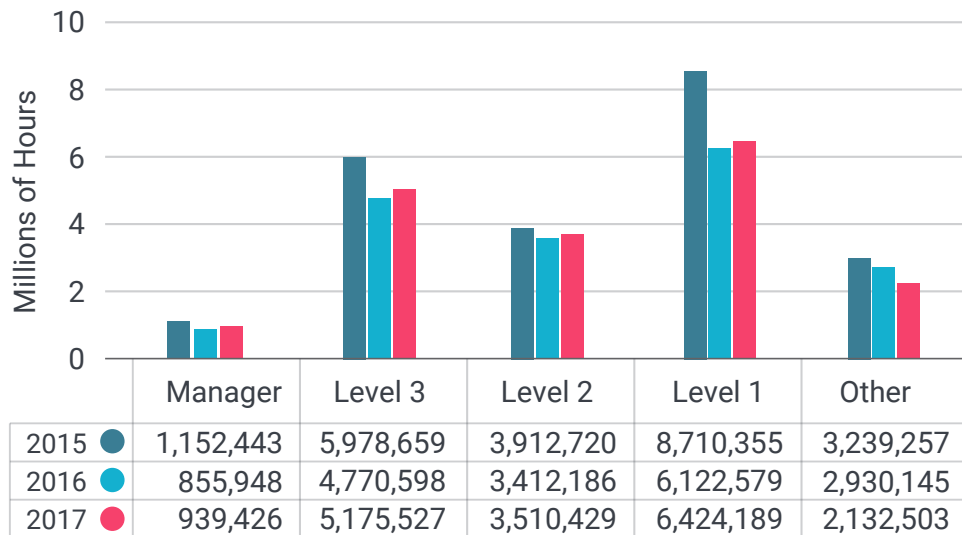




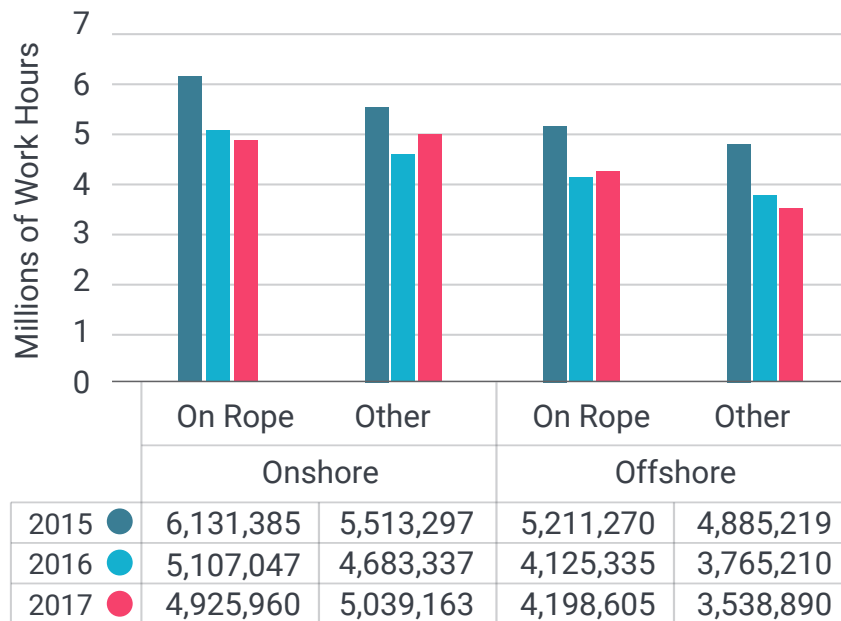


Image courtesy of Klätterteknik AB

**Fig. 3**  
**Work Hours by Grade**



**Fig. 4**  
**Work Hours by Location**





## 3.2 Hours Worked

The total hours worked in 2017 was 18,182,076 or about 18.2 million including training. This is slightly less than the 18,501,983 recorded for 2016 and will be reflected by a lower utilisation in view of the higher employment level for 2017. Fig. 3 shows the worked hours for each grade for the last three years.

The marginal increase in worked hours for each of the rope technician grades is evident. The overall utilisation (hours worked divided by number of employees) has usually been well below maximum, based on 2,000 hours per employee per annum. The table below summarises utilisation over the last few years, together with the 2017 figure. It has been noted previously that many technicians may use their work skills elsewhere and this is reflected generally in lower than maximum utilisations for rope access employees. This appears to be the case particularly for the larger companies that report relatively low utilisation figures. The current utilisation is well below that for several years.

Year	Utilisation Hours / worker per annum
2013	1,324
2014	1,402
2015	1,793
2016	1,381
2017	1,171

It may be noted that utilisations in 2017 for the three individual grades were as follows:

**Level 1 - 1,064; Level 2 - 1,213; Level 3 -1,152.**

A negative consequence of such a low utilisation, that will become apparent later, is that the 'effective' workforce is greatly reduced. A workforce based on full time employment will be about 60% of the actual reported number of employees, because of the low utilisation. Thus, analysis of accident and incident data will be based on an effectively reduced number of full time workers, increasing calculated accident rates.

Turning now to the location of work hours, Fig. 4 compares the distribution of work hours between onshore and offshore alongside previous years (excluding training).

*It has been noted previously that many technicians may use their work skills elsewhere and this is reflected generally in lower than maximum utilisations for rope access employees. This appears to be the case particularly for the larger companies that report relatively low utilisation figures.*

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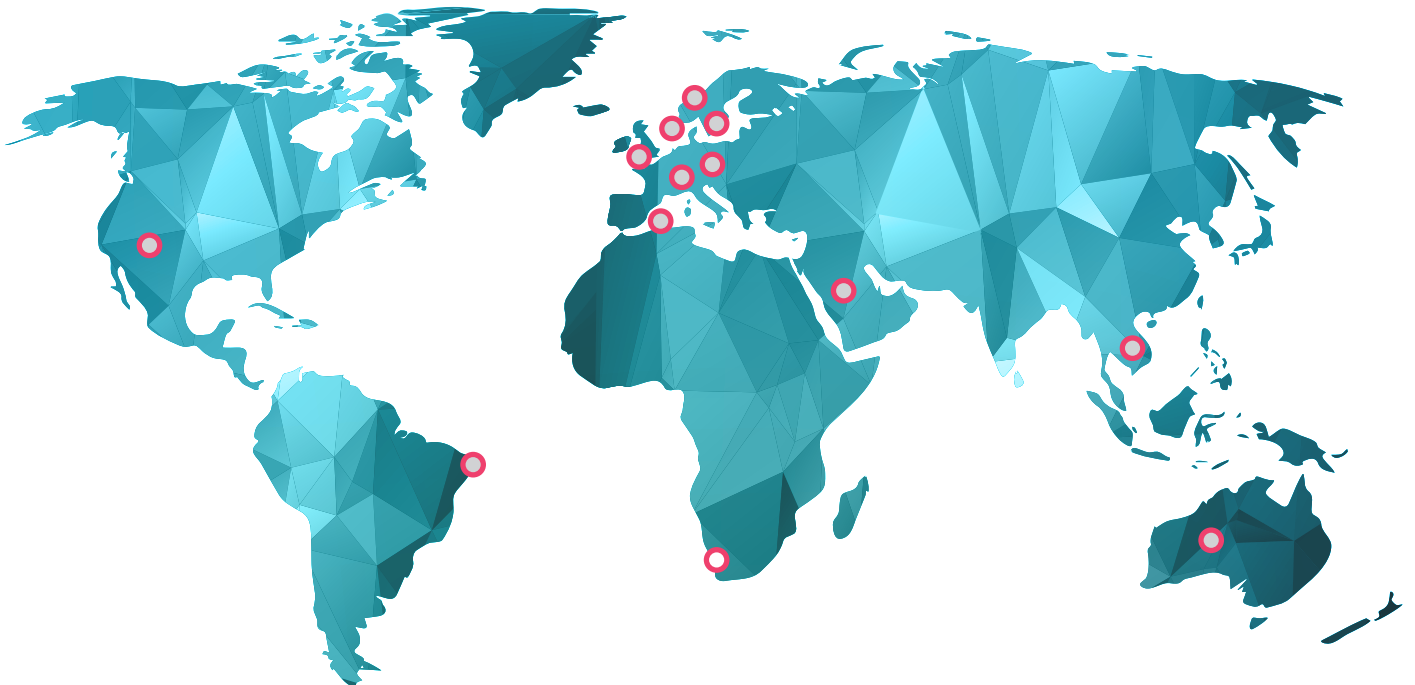
### 3.3 Training

The Association places great emphasis on training - an essential factor for safe working practice. Training referred to in this report solely relates to rope access training. The table in 3.4.1 summarises the training data submitted for each RAC.

The total of hours reported for training was 479,459 (410,527 in 2016) and is about 2.6% of the 18 million work hours. Given ~14,000 technicians and trainees, this equates to about 34 hours training per technician during the year. The introduction of the Rope Access Manager Rope Access Safety Supervisor (RAMRASS) additional training should raise the training level still further in 2018.

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## Regional Advisory Committees in the World





## 3.4 Regional Advisory Committees (RACs)

In 2012, it was decided that zones or regions around the world would be established and overseen by Regional Advisory Committees (RACs). There are currently 13 RACs identified as follows:

- Australasia
- Benelux
- Brazil
- D-A-CH (Germany, Austria and Switzerland)
- Mediterranean
- Middle East, Central Asia & South Asia (MECASA)
- North America
- North Sea Operators
- Other (diverse, includes West Africa and Ireland)
- Scandinavia
- South Africa
- South East Asia & Far East
- UK

Table 1 on the next page gives the distribution of employees according to grade for each RAC. The figures are averages of the four Q figures supplied.

The average ratio of technician grades is L3:L2:L1 = 3:2:4. Thus, on average, a Level 3 may supervise two other technicians. Individual RACs and members may wish to compare their own figures with these averages.

The distribution of work hours between onshore and offshore working are shown in Table 2 for each RAC. In addition, training hours are shown to give overall total hours for each RAC.

Table 3 summarises the employment and work hours along with training data for each RAC. The large range of utilisations may be noted.

It may be of interest for each RAC to compare its 2016 and 2017 data for employment and associated work hours given in Table 4.

Although training is omitted from the 2016 figures for work hours, this will have only a marginal effect. Rounding errors cause the small variation of 1 in the 2017 employment total. Inspection of the data shows the variations in growth and decline of the various RACs. Major growth in employment occurred for Australasia (35%), MECASA (23%), South East Asia & Far East (34%) and UK (14%). However, only in the case of MECASA and South East Asia & Far East were the increases in employment matched by increases in work hours (~20% each).

Previous reports have presented more detailed charts and data for each individual RAC. This process is abandoned for report brevity, relying on the summary data provided in the tables on the following pages. However, individual RAC reports of details may be prepared on request.

**Table 1**  
**Summary - RAC Employees Totals**

RAC	Managers	Level 3	Level 2	Level 1	Other	TOTAL
Australasia	67	530	236	595	44	1,472
Benelux	33	158	85	147	46	469
Brazil	34	176	131	316	96	752
D-A-CH	8	21	7	8	10	54
Mediterranean	20	41	21	49	15	146
MECASA	74	299	335	631	323	1,662
North America	39	190	144	384	38	793
North Sea Operators	31	614	292	794	236	1,966
Other	77	414	311	526	123	1,450
Scandinavia	20	88	72	48	15	244
South Africa	20	74	46	83	63	286
South East Asia & Far East	86	519	432	932	105	2,072
UK	226	1,369	783	1,526	264	4,167
<b>TOTAL</b>	<b>731</b>	<b>4,492</b>	<b>2,893</b>	<b>6,038</b>	<b>1,377</b>	<b>15,530</b>

**Table 2**  
**Summary - RAC Hours by Type of Work**

RAC	Onshore on ropes	Onshore other	Offshore on ropes	Offshore other	Training	TOTALS
Australasia	752,677	363,244	193,053	124,134	28,348	1,461,456
Benelux	146,637	112,974	86,926	37,458	9,093	393,088
Brazil	57,479	73,143	189,203	113,606	74,330	507,760
D-A-CH	28,408	21,538	-	-	2,213	52,159
Mediterranean	62,621	67,824	1,371	30	10,505	142,351
MECASA	1,244,063	1,292,313	263,760	318,902	33,240	3,152,278
North America	359,138	391,072	39,939	36,546	40,546	867,241
North Sea Operators	123,465	390,570	758,876	1,225,365	16,061	2,514,336
Other	280,716	353,446	495,040	460,578	74,632	1,664,412
Scandinavia	140,754	66,268	29,555	23,320	1,806	261,702
South Africa	35,533	188,613	52,427	69,996	18,140	364,709
South East Asia & Far East	484,622	626,242	825,359	325,449	60,257	2,321,930
UK	1,209,848	1,091,916	1,263,095	803,506	110,289	4,478,654
<b>TOTAL</b>	<b>4,925,960</b>	<b>5,039,163</b>	<b>4,198,605</b>	<b>3,538,890</b>	<b>479,459</b>	<b>18,182,076</b>



**Table 3**  
**Summary of RAC Utilisations**

<b>RAC</b>	<b>Employed</b> (Average of 4Q's)	<b>Work hours</b> (including training)	<b>Utilisation</b> (hours per employee)
Australasia	1,472	1,461,456	993
Benelux	469	393,088	839
Brazil	752	507,760	675
D-A-CH	54	52,159	966
Mediterranean	146	142,351	974
MECASA	1,662	3,152,278	1,897
North America	793	867,241	1,093
North Sea Operators	1,966	2,514,336	1,279
Other	1,450	1,664,412	1,148
Scandinavia	244	261,702	1,073
South Africa	286	364,709	1,277
South East Asia & Far East	2,072	2,321,930	1,120
UK	4,167	4,478,654	1,075
<b>TOTALS / AVERAGE</b>	<b>15,531</b>	<b>18,182,076</b>	<b>1,171</b>

**Table 4**  
**2016 / 2017 RAC Comparisons**

<b>RAC</b>	<b>Employed</b> <b>2016</b>	<b>Employed</b> <b>2017</b>	<b>Work Hours</b> <b>2016*</b>	<b>Work Hours</b> <b>2017**</b>
Australasia	1,108	1,472	1,373,625	1,461,456
Benelux	335	469	307,779	393,088
Brazil	566	752	561,977	507,760
D-A-CH	44	54	42,694	52,159
Mediterranean	55	146	48,686	142,351
MECASA	1,340	1,662	2,668,281	3,152,278
North America	725	793	751,101	867,241
North Sea Operators	1,896	1,966	3,414,443	2,514,336
Other	1,302	1,450	1,642,799	1,664,412
Scandinavia	194	244	242,614	261,702
South Africa	500	286	763,884	364,709
South East Asia & Far East	1,426	2,072	1,910,512	2,321,930
UK	3,611	4,167	4,363,062	4,478,654
<b>TOTALS</b>	<b>13,100</b>	<b>15,531</b>	<b>18,091,456</b>	<b>18,182,076</b>



## 4. Accident and Incident Statistics

### 4.1 Introduction and Definitions

The following descriptions apply to terms used in the sections that follow.

#### FATALITY

Death within one year as a result of an accident or illness at work or caused by work.

#### MAJOR INJURY

Injuries that meet criteria common to most European agencies and other countries and as listed in IRATA reporting arrangements. 'Major' injuries would include, for example, broken major bones, amputations, major dislocations, loss of eyesight and need for resuscitation. There is no associated criterion for 'days off work'.

#### OVER 7 DAY INJURY

Not a 'Major' injury but an injury requiring more than seven days away from normal work irrespective of cause. 'Serious' is synonymous with 'Over 7 Day Injury'.

#### LESS THAN 7 DAY INJURY

The criterion for a non-reportable accident is now 'less than 7 days off work' (although required to be recorded in the UK by duty-holders). If any injury is incurred, no matter how trivial, the minimum reporting level is 'Less than 7 Day Injury' and, in this report, includes all incidents of ill-health and sprains/strains (see below) unless resulting in 'Over 7 Day Injury'.

#### DANGEROUS OCCURRENCE

Incident that could have resulted in injury or death, but none was incurred. DOs are not allocated to specific worker or grade category because many incidents are not attributable to or affect specific individuals. There must be no actual injury but there must be potential for injury.

#### ILL HEALTH

Medical condition that lead to interruption or suspension of work due to non-injurious cause e.g. psychological, heat- or cold-stress, taken unwell (headache, stomach upset) or other non-trauma medical condition brought on by or made worse by work. Reported as either 'Over 7 Day' or as 'Less than 7 Day' injury or, if death occurs within 12 months, fatality.

#### SPRAINS & STRAINS

Muscular injuries that result in prevention or cessation of work. As above, reported as 'Over 7 Day Injury', otherwise as 'Less than 7 Day Injury'.

#### REPORTABLE ACCIDENTS

For the purpose of this report, and used for comparative purposes later, this term is the total of all fatalities, 'Major' injuries and 'Over 7 Day' injuries. Thus, 'Less than 7 Day' injuries and 'Dangerous Occurrences' are excluded when comparisons are made with other international statistical data, although Eurostat and BLS data requires consideration of some 'Less than 7 Day' injuries.

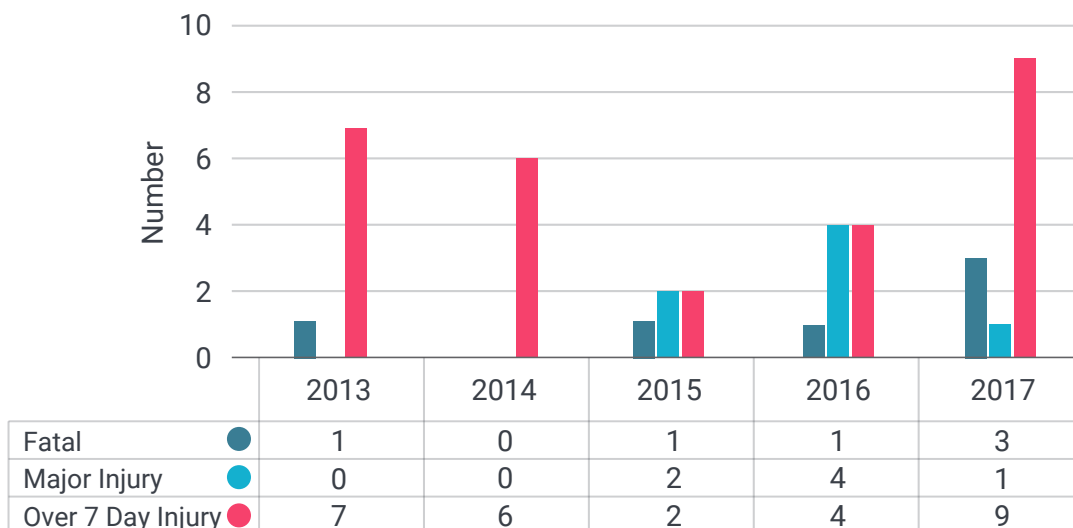
## 4.2 Consequence of Accidents and Incidents

The consequence of all reported accidents and incidents is shown on the following charts together with those for the previous four years. The reason for selecting a five-year period will become apparent when calculating fatality rates. A total of 148 acceptable reports were received. The reportable accidents are shown separately in Fig. 5 to ensure clarity of the much smaller numbers involved compared to those for 'Less than 7 Day' injuries and Dangerous Occurrence (DO) in Fig. 6. Immediately obvious is the number of fatalities and 'Over 7 Day' injuries suffered in 2017, although only a single 'Major' injury is shown for 2017.

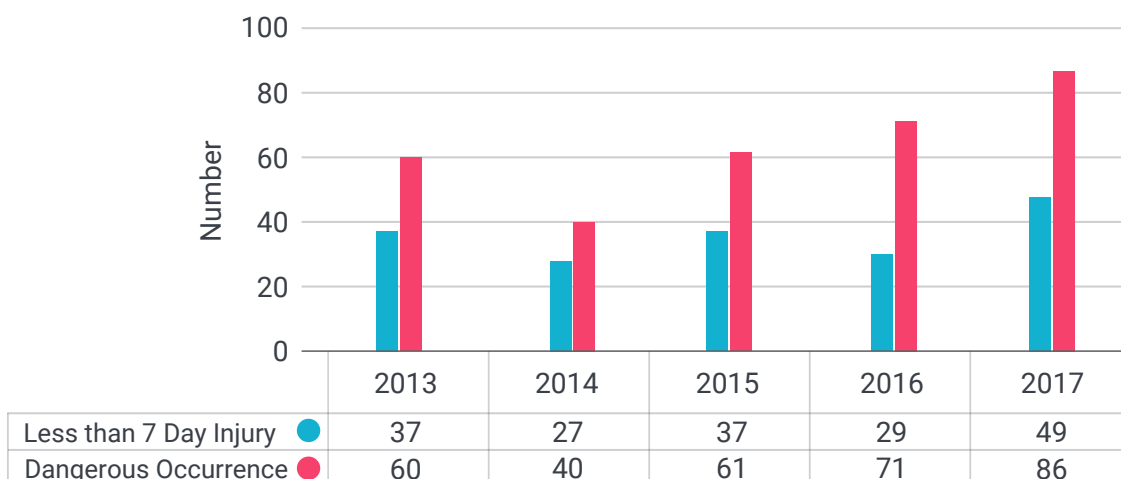
Of the total 148 reports received, the majority fell into the 'not reportable' category with 86 'Dangerous Occurrences' and 49 'Less than 7 Day' injuries. Significant increases in both categories are evident. 'Dangerous Occurrences' have risen, but still remain well below that expected for 18 million work hours.

**A total of 13 reportable accidents** were recorded, very sadly including three fatalities. The fatality figure will have a detrimental impact when calculating accident rates.

**Fig. 5**  
**Reportable Accidents 2013 -2017**



**Fig. 6**  
**'Minor' Injuries and DOs 2013 -2017**





## 4.3 Location of Accidents and Incidents

The total number of all reported events (accidents and 'Dangerous Occurrences') for the last three years is shown in Fig. 7. The significant increase in reporting 'On Rope' events is evident. However, the chart does not allow for variations in 'exposed' hours. Dividing the numbers by the work hours for each location gives a quite different result as shown in Fig. 8.

Now, the inherent risks of training become apparent. But before conclusions are reached, it will also be necessary to examine the consequences of events, in terms of actual injuries, because it has been argued that training establishments are perhaps likely to be more vigilant in reporting events than others. Actual extent of injuries and illnesses, in isolation from 'Dangerous Occurrences', is summarised in the table below. The breakdown of injuries by seriousness reveals that, as expected, more 'Minor' injuries occurred when 'On Rope'.

**Table 5**  
**Summary of Accident Numbers**

	Fatal	Major	Over 7 Day Injury	Less than 7 Day Injury	Illness	Strain / Sprain
On Rope	2	1	5	28	2	6
Other	1	0	4	11	2	7
Training	0	0	0	10	2	6

(Both the 'On Rope' and 'Off Rope' 'Over 7 Day' injuries include a single strain/sprain in each case. All remaining illnesses and sprains/strains are included within 'Less than 7 Day' injuries)

However, taking into account 'exposed' hours (i.e. dividing the numbers by the hours for each location) the injury rate during training becomes more dominant but is restricted to 'Minor' injuries only (i.e. 'Less than 7 Day' injuries). It is fortunate that no serious injuries were sustained during training, but the frequency of 'Minor' injuries serves as a reminder to trainers, as in previous years.

Turning to the 86 Dangerous Occurrence reports (no injury), similar results are found:

On Rope 67  
Other 11  
Training 8

**Table 6**  
**Summary of Accidents per Million Work / Training Hours**

	Fatal	Major	Over 7 Day Injury	Under 7 Day Injury	Illness	Strain / Sprain
On Rope	0.22	0.11	0.55	3.07	0.22	0.66
Other	0.12	0	0.47	1.28	0.23	0.82
Training	0	0	0	20.8	4.2	12.5

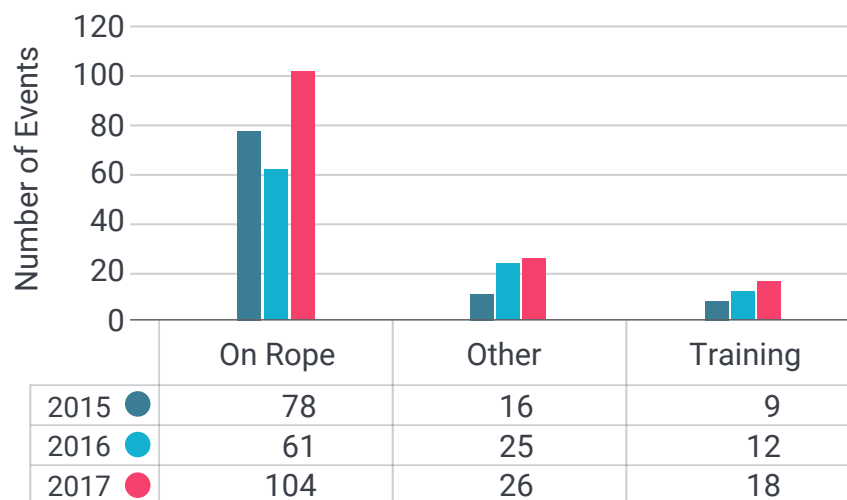
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Not surprisingly, 'On Rope' accounted for the bulk of reports, equivalent to 7.3 reports per million hours of work. 'Other' locations accounted for only 11 reports, equivalent to 1.3 reports per million hours. Again, training, with only 8 reports, accounted for 16.7 events per million training hours, significantly higher than 'On Rope'. In the case of training, it is presumed that the reports related to events beyond the 'normal' errors or omissions that would occur during training. Examination of all training 'Dangerous Occurrence' reports shows that two were related to rope damage, four to equipment mal-operation or faults, a rigging fault, a dropped pipe section and cessation of training due to high temperatures.

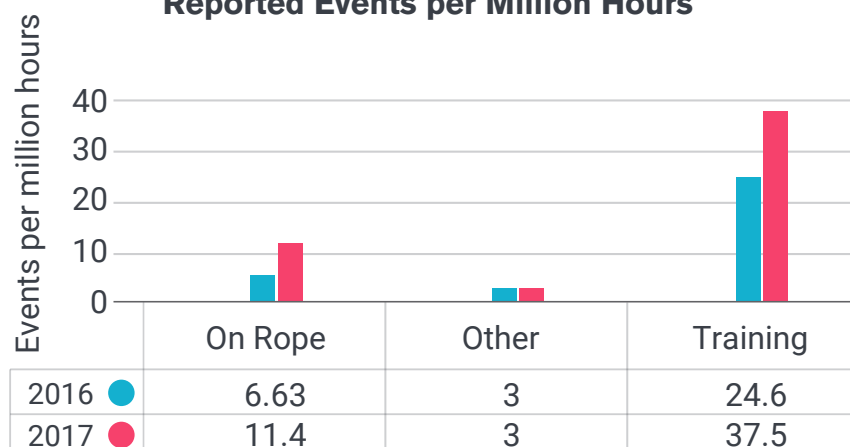
It is important to note that, unlike actual injury events, 'Dangerous Occurrences' are welcomed. With 18 million work hours recorded, 86 remains well below a realistic level.

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**Fig. 7**  
**Number of Events Reported**



**Fig. 8**  
**Reported Events per Million Hours**



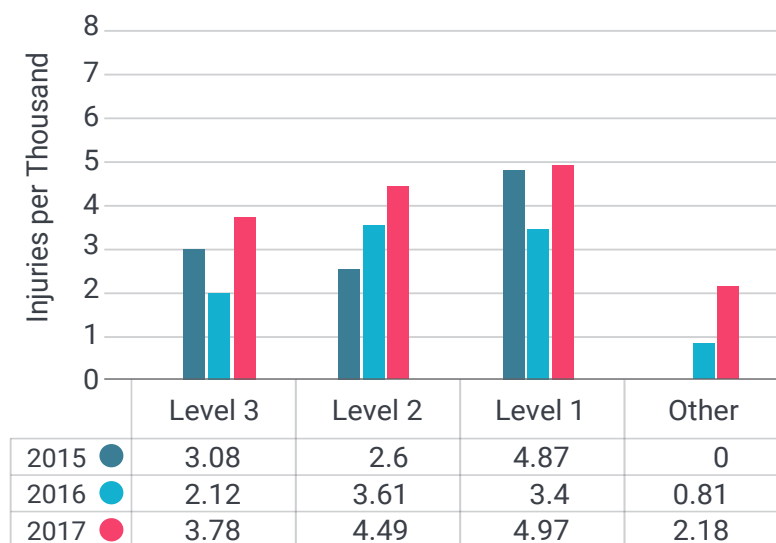
Since injuries relate to individuals, the following section is based on actual numerical employment rather than hours worked. Fig.9 shows the rates of injury for each Level or grade, excluding managers (nil), obtained by dividing the actual number of injuries by the average population of each Level or grade. This allows differences in population of the grades and between annual variations to be taken into account.

## 4.4 Accidents Events by Grade

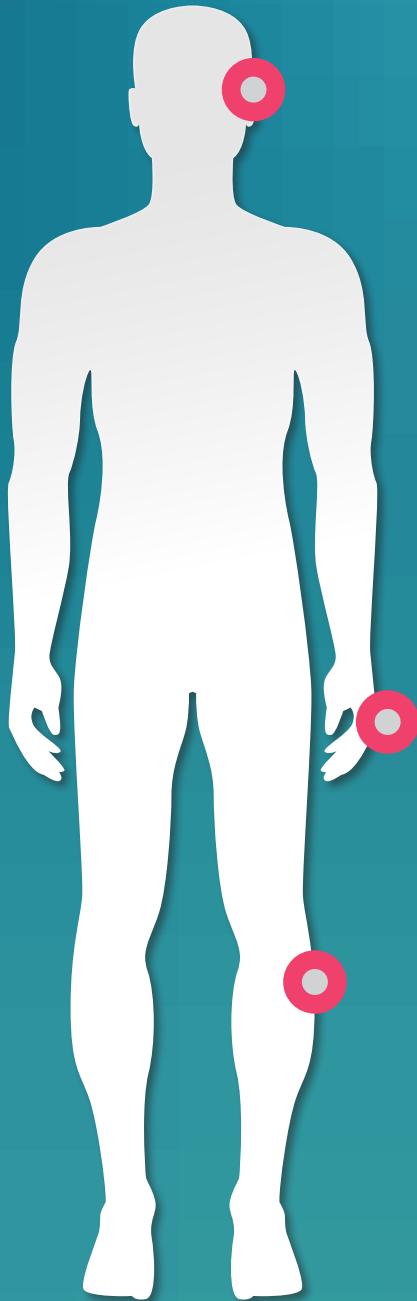
The chart immediately shows a significant increase in injurious accidents suffered by all grades. The accident rate for Level 3s nearly doubled albeit primarily 'Less than 7 Day' injuries. Two of the fatalities occurred 'On Rope' to two L1s. The third fatality occurred to a L2 technically 'Off Rope' as he fell from a ladder when unprotected. There were three injuries/illnesses to other workers, all minor.

L1s suffered marginally the highest rate of injuries, but the numbers involved remain statistically small and changes or differences in the chart may be misleading due to the low populations.

**Fig. 9**  
**Injuries by Grade**







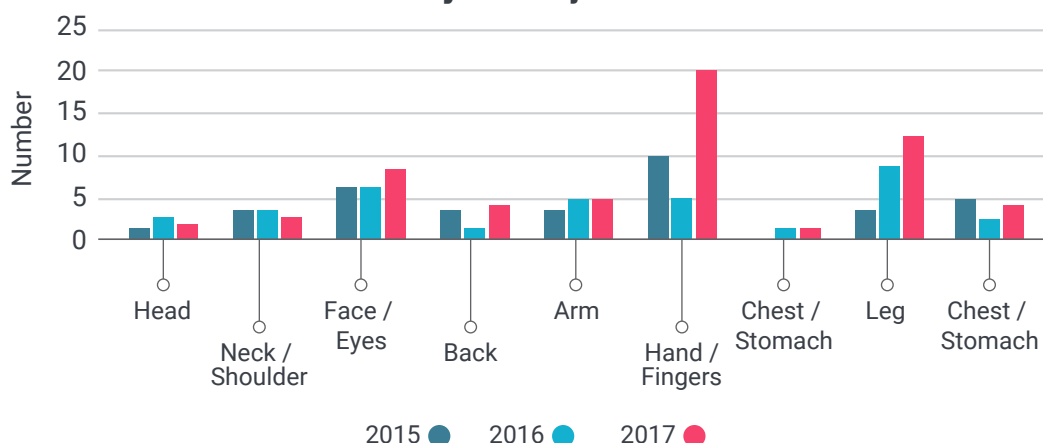
## 4.5 Body Part Injuries

Hand/finger injuries return as the majority of injuries and well above the statistics for all other injuries. In four cases, hand injuries occurred during training. There were four cuts caused by sharp blades. These, together with four other cases of hand injuries, raise the issue of gloves, either in terms of their adequacy or their necessity, since they were clearly absent in some cases. Coincidentally, there were four instances of strained thumbs from varying causes.

Of the 12 leg injuries, three were caused by strains, five by lacerations or abrasions, and two from burns. Eight facial or eye injuries occurred, six of which were caused by dust or debris entering eyes. Two injuries were caused by impacts with fixed objects, cutting a lip and chipping a tooth. A chemical splash to the face required attention.

More generally, it may be noted that several other injuries to arms, back, feet and shoulders were due to slips, trips or manual handling resulting in strains and sprains. Fatality injuries are not necessarily provided or included in this analysis.

**Fig. 10**  
**Body Part Injuries**

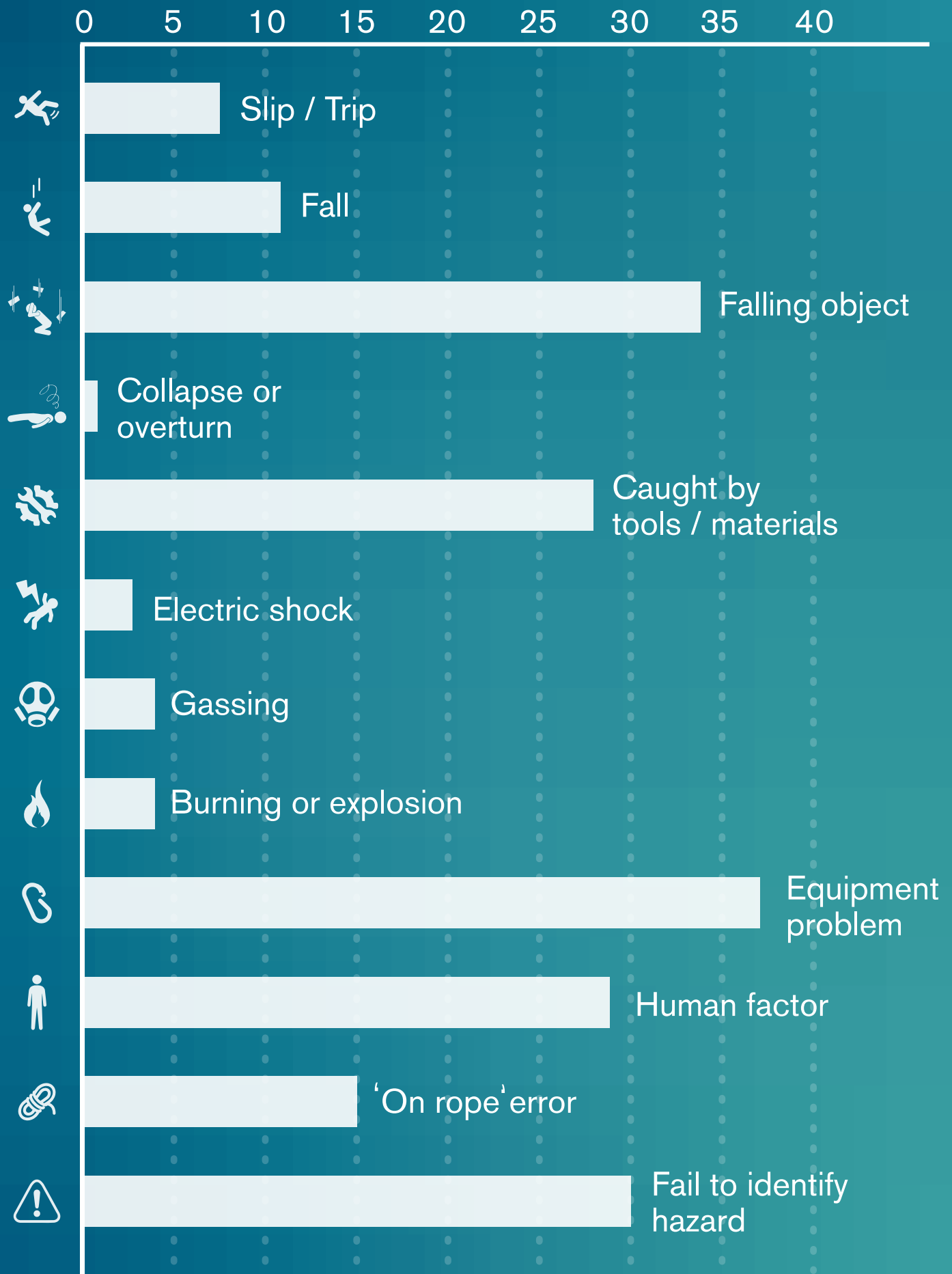








**Fig. 11**  
**Causes of Accidents and Incidents**





## 4.6 Causes of Accidents and Incidents

Only the category that most closely describes the immediate cause of an accident or a 'Dangerous Occurrence' is usually submitted in reports. These may be erroneous for various reasons, such as simply ascribing the event to an individual error. It is fully acknowledged that this is a serious weakness of this analysis, as data provided generally does not identify true root causes. Fig. 11 presents the data supplied along with some additionally identified causes. Comparison to previous years is omitted for clarity.

Before considering the data, it is necessary to provide explanation of some factors:

**Fall & Slip / Trip** - Conventionally, falls include slips and trips. However, distinction is more appropriate in this particular industry. Accordingly, they are separated in this analysis.

**Equipment problems** - Mainly relates to rope-work equipment and working.

**Human Factor** - Frequently identified, but here limited to, acts for which there is no other cause or explanation. For example, a dropped object would not be ascribed to human factor. It may also be applied to third party acts or omissions and where communication failure is a prime cause.

**Fail to identify hazard** - In some cases, it is clear that events were caused by failure to identify hazard conditions or circumstances beforehand. These are imposed on the analysis as they are not provided in submissions.

Fig. 11 shows that the highest incidence of reported cause related to equipment mal-operation and failure, four of which occurred during training. Breakdown of the 38 events gives the following:

- |           |   |
|-----------|---|
| <b>7</b>  | Mal-operation of rope devices (usually descenders)  |
| <b>18</b> | Rope break, damage or severance   |
| <b>5</b>  | Other rope related equipment (lanyards & etrier failure, bolt shearing)                                 |
| <b>8</b>  | 3rd Party items or tool failures (burst pipe, isotope handling, winch damage, drill batteries dropped). |

Clearly, of greatest concern is the high incidence of rope damage or failure. In three cases, at least, multiple rope severance occurred at the same time, one such event leading to multiple major injuries. A fatality occurred after the working rope was severed by abrasion (unprotected edge), but the back-up rope device had been rendered inoperable and unrestrained descent followed. Three severances occurred to unprotected ropes over edges. One rope was caught by rotating equipment. Four rope damages were caused when used with power ascenders. One rope was damaged by exposure to nitric acid. Ropes were damaged after being left out over a weekend. One rope was melted after contact with a hot pipe.

The number of severely damaged or severed ropes encountered (18) (all of which were avoidable), must be highlighted. The number of damaged or severed ropes compares very unfavourably with that of 5 reported in 2016. It seems that historical fatalities have been insufficient to heed the need for edge protection.

Of the 33 falling objects, 32 were dropped by technicians. The range of objects dropped varied from tool bags (3), buckets (2), a meter, camera, helmet (38 floors), drill batteries (2), assorted tools (hammer, glass sucker, trolley) to various building materials, items of climbing equipment and a magnet. In many cases, securing lanyards or tethers failed or were inadequate for the purpose. The only other event was a rock fall or landslide, sadly resulting in a fatality. In 2016, 19 falling objects were reported.

At least 30 items have been identified where a clear lack of hazard identification may have led directly to their cause. Closer, more detailed consideration would probably reveal more. Failures to identify hazards may be considered under general headings (with some examples):

**4 Environment** (Icing, wind (tangled ropes & damaged ropes left out), high ambient temperatures).

**7 Site safety** (loose objects, stuck/jammed ropes, rock fall, entrapment by loose debris, attachment to movable vehicle, vehicle intrusion and impact on fixed ropes).

**6 Personnel safety / procedures** (inadequate PPE (2), sharp open knives (4), deviation magnet handling, off rope unprotected ladder climbing leading to fatality).

**4 Personnel medical conditions** (tiredness (2), diabetes hypoglycemic shock, wound infection).

**3 Communications/isolation failures** (client liaison dispute, ropes attached to vehicle moved by 3rd party, live light fittings).

**7 Miscellaneous** (mainly rope related such as failure to use edge protection).

Responsibility is predominantly with managers/supervisors for most of the above.

Human factors were involved in 29 reports. The majority related to errors of judgement during 'On Rope' working and/or instances of illness, tiredness or poor communications between team members and/or 3rd parties.

A variety of 28 injuries and 'Dangerous Occurrences' were reported involving plant, equipment and materials that may be summarised under the following:

- 8 Striking fixed plant/items
- 4 Handling work tools
- 6 Dust/particulates in eyes
- 4 Cuts by knives
- 4 Caught by moving plant, vehicles or debris
- 2 Miscellaneous

One of the miscellaneous items involved a face splashed with hypochlorite solution. One incident involved a 3rd party driving a cherry picker into fixed ropes – an example of poor site protection.

The 15 cases of specific rope errors included several instances of problems with abseiling (mainly fitting and operation of descender devices), but most worrying were 5 instances of failure to use rope protection and two inadequate rigging of anchorages. However, the instances of rope errors overall were only about half that recorded in 2016 (26), although two led to fatality and 'Major' injury in 2017.

Of the 11 reports of falls, three were short drops onto back-up or cowtails when a foot loop snapped, an etrier and a descender failed. Two were falls from ladders (no injury in one case, but a fatality in the second case).



One 'fall' into water resulted during a rope transfer, although described as an 'unplanned descent'. A trainee failed to thread a descender correctly and, as uncontrolled descent commenced, grabbed adjacent ropes. The resulting slow hand-controlled descent (and consequent friction burns) prevented the back-up operating to halt the descent. In the case of the fatality, the back-up could not operate effectively because it had not been correctly fitted and an uncontrolled fall led to the fatality. In the second case, the back-up arrested the fall, but it too was eventually severed, resulting in multiple severe injuries. No apology is made for repetition of the circumstances of these two latter events.

Slips and trips generally led to 'Minor' injuries but, three resulted in 'Over 7 Day' injuries - in one case, a serious hand injury and, in two cases, shoulder injuries.

The four 'gassing' incidents were all precautionary withdrawals when monitors alarmed. Of the four 'burns', two were welders burnt by hot slag, one to the hand (despite gloves) and one to the groin (inadequate protection). One technician received a leg burn from a hot pipe. The remaining burn was a result of a rope contacting a hot pipe. Three 'electric shocks' were reported. One, a 'tingle' from a 12 v light, a second from a light fitting being adjusted and a third when a wire sling attached to a technicians' harness contacted a crane bus-bar. In the latter case, exposure of the bus-bar may be questioned.

Finally, the rock slide / landslide event that led to a fatality may be noted. This is under investigation and no further information is available at the time of writing.

Interestingly, there were no instances reported of medical conditions brought on by hot/humid conditions and, for once, the possible role of tiredness contributing to events is acknowledged in two reports. There were no reported injuries to third parties as a result of rope access working.







## 4.7 Time Lost

Of the 59 reported injuries, excluding the three fatalities, only 21 reported time off work. Reported days off work totalled a minimum of about 130 days or about  $130/21 = \sim 6.2$  days per injury/illness event. This is significantly less than the UK HSE injuries and illnesses figure of 17 days per worker in 2017. Under-reporting may be a continuing problem with member reports and some injury cases continued to have time off work at the time of reporting.

<http://www.hse.gov.uk/statistics/lfs/index.htm> - see table LFSWDL <http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

Accepting differences in recording accident data, the US private industry for 2016 injury/illness rate was 91.7 events per 10,000 full time workers. With a median of 8 days per injury/illness this gives 0.0073 days per worker. Converting to equivalent full time workers ( $1.17/2$ ) the IRATA figure becomes  $(130/15,531) \times (1.17/2) = 0.0049$  days per worker, less than the US rate for days lost. (Note that the US data is a 'median', that is half the cases had fewer days and half had more days lost). (<http://www.bls.gov/news.release/pdf/osh2.pdf>)

It is emphasised that these comparisons may be hindered by under-reporting of time lost. No account has been taken of the circumstances of the three fatalities in terms of time lost, in common with other reporting agencies.

## 4.8 Other Factors

### Weather or Working Conditions

Only four reports indicated that weather conditions had a significant influence. Very cold conditions halted work in one case; rain and wetted surfaces caused a slip and wind caused ropes to tangle in a third event. High temperatures interrupted training. Notably, there were no reports that hot and/or humid conditions caused a problem although, high ambient temperatures were recorded in many instances. It is not known if weather conditions had any influence on the three fatalities.

### Rescue

Rescue was required in 7 cases. Two were complex, requiring third party support (e.g. cranes) and a third required fast rescue craft for a sea rescue.

## 4.9 Summary

The total number of acceptable accident and incident reports submitted in 2017 was 148. Within that number, injuries totalled 62 of which 13 were reportable including, very sadly, three fatalities, a single 'Major' Injury (multiple injuries sustained) and 9 'Over 7 Day' injuries. The remaining 49 were 'Less than 7 Day' injuries that included 25 strains/sprains and ill-health issues. Reports of various 'Dangerous Occurrences' totalled 86.



## 5. Comparison of Accident Data

### 5.1 Basis for Comparison

Conventionally, accident statistics are based on accidents per 100,000 workers. To maintain consistency with this practice, it is necessary to convert actual accident numbers to an equivalent workforce of 100,000. To maintain a pessimistic analysis, a workforce corresponding to the hours worked will be used i.e. full-time employment. This is 18.2 million hours / 2,000 hrs per person per annum = 9,100, considerably less than the reported workforce of over 15,500.

The 'multiplication factor' per accident becomes  $100,000 / \text{Number of Employees} = 100,000 / 9,100 = 11.0$  per accident. This figure is the multiplication of any single event to reach the equivalent for a workforce of 100,000. The accident rates in 2017 become:

- **Fatality**  $3 \times 11.0 = 33$  per 100,000
- **'Major' injuries**  $1 \times 11.0 = 11$  per 100,000
- **'Over 7 Day' Injuries**  $9 \times 11.0 = 99$  per 100,000

Thus, the total for combined reportable fatalities, injuries and illnesses was 143 per 100,000 workers and 110 for injuries alone.

### 5.2 Comparison against UK, EU and USA data

Although it would be preferred to present all comparative data together, differences in data collection between the various agencies require that each must be considered separately, adjusting IRATA data accordingly. The UK Health and Safety Executive (HSE) website key figures for 2017 provisional data for employees in selected industries are tabulated below, together with equivalent IRATA figures. HSE accepts that its figures may be approximately 50% under-reported.

<http://www.hse.gov.uk/statistics/tables/index.htm> (e.g. See Table RIDHIST - 2016/17)

**Table 7**  
**Accident Rates v UK HSE 2017**

Industry	Fatalities	Major Injury	Over 7 Day Injuries	Total (excludes Fatalities)
Agriculture, Forestry, Fishing	7.6	204	319	523
Manufacturing	0.7	103	360	463
Construction	1.4	139	259	398
All Industries	0.43	68	206	274
IRATA	33	11	99	110

Overall, the IRATA figures for injuries in the table remain well below all categories with the exception of fatality, the full impact of which is now revealed. The overall IRATA injury rate is ~ 40% of the UK 'All Industry' rate and falls still further to ~20% if the under-reporting is taken into account. However, the fatality rate is considerably greater – a fact that will be considered in more detail later. EUROSTAT figures are for 2015 (latest), based on 'Over 4 Day' injuries. Therefore, in order to compare data, it is necessary to extract those accidents that approach the '4 days or more off work' criterion.

The number of injuries that required '4 days or more off work' remained 10 (no additional injuries) giving a rate of  $10 \times 11 = 110$  injuries per 100,000. This figure may now be compared to EU 28 2015 figures, noting the large range of figures supplied by individual member states:

**Table 8**  
**Accident Rates v Eurostat 2015 Data**

Industry	Fatal	Range of fatal injuries	Over 4 Day Injuries	Range of injuries by country
Agriculture, forestry, fishing	5.7	0.2 - 33.5	1,892	69 - 5,223
Manufacturing	1.9	0.7 - 5.5	1,869	106 - 4,296
Construction	6.2	1.0 - 17.9	2,852	131 - 7,294
All EU Industry	1.8	0 - 5.5	1,513	96 - 3,160
IRATA	33		110	

(All figures injuries per 100,000)

The IRATA rate for all injuries is less than 7% of the average 'All' EU-28 figure for 2015, much as in 2016. However, the fatality rate is well above the EU 'All Industry' rate and some 5x that for construction and agriculture etc.

<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

<http://ec.europa.eu/eurostat/data/database>

(The folder containing data is under: Database by themes: 'Population and social conditions': sub-folder of 'health': sub-folder 'Health and safety at work (hsw)': sub-folder of 'Accidents at work (hsw\_acc\_work)': sub-folder (hsw\_mi): sub-group (hsw\_mi01) and other tables).

Care is also needed in comparing IRATA data to US data due to differences in the way injuries and illnesses are defined and classified. The table below presents some injury and illness data presented by US Bureau of Labor for 2016. US data is based on full time workers working 2,000 hours per annum, and hence comparable to those in this report. BLS data includes all accidents and illnesses requiring days off work. Hence, it is necessary to select all injuries and illnesses that required any time off work. These total 21, giving a rate of  $21 \times 11 = 231$  injuries/illnesses per 100,000. This figure is added to the BLS summaries in Table 9 (all figures per 100,000 workers).

The IRATA figure for all injuries is well below all US figures and only 25% of the 'All private industry' rate, much the same as the 22% in 2016. However, once more the fatality rate is almost tenfold the BLS 'All industry' rate, although approaching the construction and agriculture rates, in line with the EU data.

**Table 9**  
**Accident Rates v USA BLS 2016 Data**

US Private Industry Sector	Fatalities	Non-fatal Injuries and Illnesses with Days Away from Work
Agriculture, Forestry, Fishing	23.2	1,700
Manufacturing	2.0	949
Construction	10.1	1,300
All private industry	3.6	917
IRATA	33	231

These pages were left black as a sign of respect for the victims.



“

### 5.3 The Fatalities

Fatalities also occurred in 2016, 2015 and 2013. It will also be recalled that, when dealing with such low numeric events, it is common practice to ‘sum’ over a period of time, typically a three- or five-year period. The latter has been selected to coincide with current data. Over the five-year period, 2013-2017, the six fatalities in a ‘working’ population of about 45,000 full time equivalent workers (about 90 million accumulated hours), gives a fatality rate of **13 per 100,000 workers**.

Whilst some individual data may be comparable to this figure, there can be no doubt that it greatly exceeds typical averages that vary in the range 0.4 to 4 fatalities per 100,000, as in the data presented above for UK, EU and USA.

Thus, the impact of relatively small numbers on a small population has resulted in a fatality rate some 3 to 30 times that of other average major statistics for all industries.

**The reported fatalities are a sad reminder of the need for sustained vigilance by all involved in rope access. But inevitably, the true impact of the fatalities for family and friends of the deceased cannot be measured or calculated.**

”

## 5.4 Working ‘On Rope’

There is natural interest in ‘On Rope’ working data, the statistics for which are summarised below. The number of all injuries and instances of ill health and strains/sprains during ‘On Rope’ working for 2017 is as follows:

Fatality	2 (Reportable)
‘Major’ Injury	1 (Reportable)
‘Over 7 Day’ Injury	5 (Reportable)
‘Less than 7 Day’ Injury*	28
TOTAL	36

\* includes strains / sprains / ill health

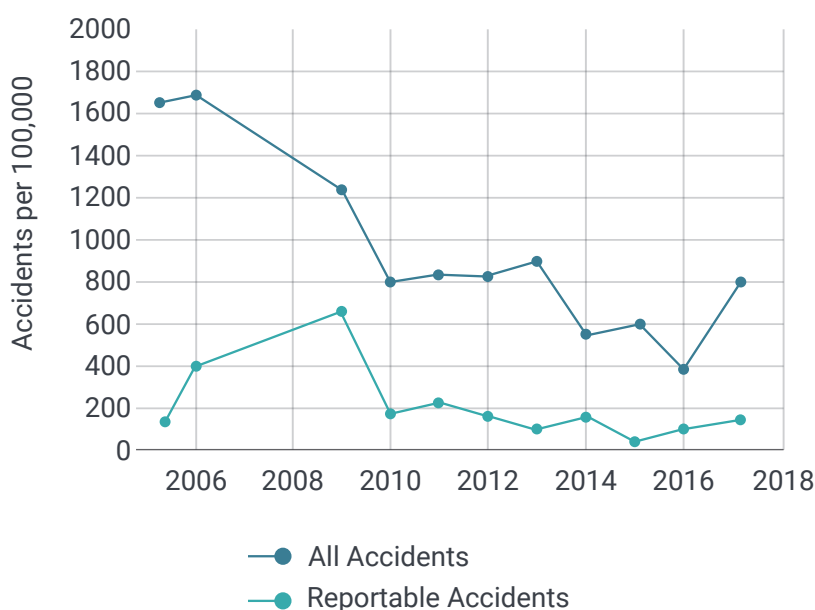
The total hours worked ‘On Rope’ in 2017 was 9.125 million hours (excluding training hours). Thus, the accident rate per 100,000 hours is given by total injuries x 100,000 / total work hours ‘On Rope’ =  $36 \times 105 / 9.125 \times 10^6 = \sim 0.4$  all injuries per 100,000 hours. This is equal to 789 per 100,000 workers (based on 2,000 hours per person per annum i.e. full time equivalent workers).

A similar calculation for the 9 reportable accidents only gives a rate of 175 per 100,000 workers. A graphical presentation of the accident rate per year is shown in Fig. 12. The Table in Appendix is a compilation of data since 1989 and is extended to include the above figures.

The increase in both reportable and particularly, all injuries whilst ‘On Rope’ working, is evident. There is an increase in actual number of ‘On Rope’ accidents, relative to previous years. The graphical effect is modestly pronounced because of a decrease in ‘On Rope’ work hours over the previous two years.

It is emphasised that the graph is based solely on accidents that occurred whilst ‘On Rope’ and includes all accidents including ‘Less than 7 Day’ injuries and fatalities. Thus, the blue line (all accidents) must not be compared to other sources of data that are based solely on reportable accidents (the red line).

**Fig. 12**  
**‘On Rope’ Accidents 2007 - 2017**





## **5.5 Accident and Incident Data and Regional Advisory Committees**

No attempt is made to apportion accident or incident data to RACs for the following reasons:

- RACs operate under differing conditions, environments and circumstances. Further, the types of work typically carried out vary from one to another with differing risk elements;
- Ranking could lead to a competitive attitude and, counterproductively, may result in temptation to withhold submissions, particularly for non-reportable incidents where most data resides, and finally;
- Low numbers of accidents and incidents, distributed between 13 RACs, would give virtually meaningless statistics.



## 6. Summary

### Membership and Employment

- Membership rose to 389 members by December 2017.
- The average employment increased from 13,100 to 15,530 with a significant increase of over 1,000 in L1 technicians.
- Total work hours remained at about 18.2 million hours including training.
- Training remained at 480,000 hours, 2.6% of all hours.
- Hours spent 'On Rope' fell slightly, from 9.2 to 9.1 million.
- Hours spent working onshore was 10 million and 7.7 million offshore.
- Utilisation fell to 1,171 hours per employee, the lowest for five years.

### Regional Advisory Committees

- Contributions from the 13 RACs to employment varied from as low as 54 to over 4,000 employees for each RAC.
- Contributions to work hours varied from 52,000 to about 4.5 million.
- Utilisations varied considerably, from as low as 675 to 1,857 hours per employee.
- All but one reported increases in employment, whilst all but three also reported increases in work hours, marginally in 5-6 cases.





## Accident and Incident Reports

- Accident and incident submissions totalled 148, distributed as follows:

<b>3</b>	Fatalities
<b>1</b>	'Major' injury
<b>9</b>	Serious injuries ('Over 7 Day' injuries)
<b>49</b>	'Minor' injuries ('Less than 7 Day' injuries)
<b>86</b>	'Dangerous Occurrences'

- There were 13 'reportable' accidents, including three fatalities.
- 'On Rope' working accounted for two fatalities, the 'Major' injury, five of the 'Serious' injuries and over half of all minor injuries. The result is a return to 2010 - 2013 accident rates for 'On Rope' working.
- The highest injury rate, on a 'time at risk' basis, continues to be training but, fortunately all sustained injuries were 'Minor'.
- Injuries to hands/fingers (20) dominated all other body injuries. Strains and sprains were a major cause of injuries to limbs, shoulders and back.
- Highlighted are:
  - 18 instances of rope damage or severance** (notably lack of edge protection (fatality and 'major' injury) and damage by power ascenders);
  - 15 rope errors** (mainly descent and lifting operations);
  - 32 dropped objects** and;
  - 8 instances of site safety intrusions or threats** (including rock fall fatality).

## Comparison of Accident Rates with 'All Industry' Data

- A five-year average for the accumulated 6 fatalities over the years 2013-2017 is 13 fatalities per 100,000 workers. This exceeds the range of 0.4 – 4 fatality rates given for 'All industry' by the EU, UK HSE and USA BLS.
- The reportable injury and illness rate of 110 per 100,000 workers remained well below all international statistics for reportable injuries, being only 7 - 40% of all latest comparable rates provided by UK HSE, Eurostat EU28 and USA BLS.



Image courtesy of Sakhalin Rope Access Services Ltd







## 7. Conclusions

The following conclusions are based on examination of the employment data and accident and incident reports supplied by member companies during 2017, as summarised and compiled by IRATA secretariat:

1. IRATA membership continues to increase almost linearly, accompanied by increases in employment of qualified technicians and managers.

2. Work hours and training hours remain at about 18 million and 0.48 million respectively, despite membership increases. This is a net result of positive and negative changes to various regional figures (RACs).

3. The injury and illness rate remains well below 'All Industry' international figures, reflecting a continuing good safety record, although returning to 2010-2013 figures.

4. However, the three fatalities contribute to a five-year fatality rate that exceeds most other international statistics. This must be of great concern to the Association.

5. The highest injury rate, on a 'time at risk' basis, was sustained during training although only 'Minor' injuries were reported.

6. The low level of reported 'Dangerous Occurrences' continues to be of concern.

7. A number of areas are highlighted from the accident and incident reports for particular attention, based on frequency and/or potential serious consequences. These include:

- Rope damage and severance.
- Errors and omissions during 'On Rope' working, particularly descent.
- Failure to identify and protect against site hazards and 3rd party activity.
- Dropped objects.



The findings on accident and incident data should be of particular interest to managers.



Special attention should be paid to rigging and anchoring of ropes.



Dropped objects continue to haunt: many due to failure of tethers.



There were many instances of failure to identify, eliminate or control hazards.



Membership should report all incidents that can lead to injury or fatality.





## 8. Recommendations

1. The findings on accident and incident data should be of particular interest to managers, supervisors and training establishments because many identified causes of accidents lay within their area of control for the protection of technicians.
2. In view of the incidence of damaged and severed ropes, special attention and emphasis by supervisors and training establishments should be placed on:
  - a) Emphasising the need for adequate edge protection and deviations at all times.
  - b) Attention to rigging and anchoring of ropes for the protection of ropes and ensuring they are free from 3rd party threats.
  - c) Questioning the practice of leaving ropes in place when not in use.
  - d) Care when using power ascender devices and need for close adherence to safety instructions in their use.
3. Dropped objects continue to haunt, many due to failure of tethers. Prior to work, all potential for dropped objects or loose items need to be addressed, whether carried tools and equipment or items and materials in place at the work site.
4. Whilst not an integral part of this analysis, it became apparent that there were many instances of failure to identify, eliminate or control hazards. Accordingly, the need for improvements in site hazard identification and assessment should be a priority for managers and supervisors.
5. It is recommended that the IRATA Executive encourage the membership to report not only injuries, but all incidents that could have led to injury or fatality i.e. 'Dangerous Occurrences'.

# APPENDIX

## Accident Rates for 'On Rope' Working 1989 - 2017

Year	Number of Members	Work Hours 'On Rope'	None Reportable Accidents	Reportable Accidents 'On Rope'	Rate for Reportable Accidents ***	Rate for All Accidents ****
1989	9	267,504	8	0	0	6000
1990	12	327,645	7	0	0	4260
1991	16	457,928	17	0	0	7420
1992	22	537,920	13	1	380	5200
1993	23	327,000	21	0	0	12840
1994	32	348,749	11	0	0	6300
1995	32	484,285	16	0	0	6620
1996	26	559,035	18	2	720	7160
1997	31	699,688	11	9	2580	5720
1998	37	1,006,538	23	10	1980	6600
1999	33	803,365	29	3	740	7980
2000	34	887,206	21	3	680	5420
2001	49	999,010	25	4	800	5800
2002	49	1,225,930	12	0	0	1960
2003	56	1,634,482	9	0	0	1100
2004	67	1,457,848	22	1	140	3160
2005	81	2,311,265	10	3	260	1120
2006	95	2,132,141	21	1	100	2060
2007	130	2,765,483	21	2	140	1660
2008	149	3,859,584	25	8	420	1700
2009	170	4,582,642	15	14	660	1260
2010	184	5,247,365	18	4	160	840
2011	217	5,209,056	17	5	200	840
2012	247	5,655,637	19	4	140	820
2013	277	7,012,270	28	3	86	880
2014	315	7,591,977	16	5	132	560
2015	333	10,096,489	25	3	60	560
2016	353	9,232,382	13	4	87	368
2017	389	9,124,565	28	8	175	789
TOTAL		77,720,424	491	89		
Based on 2,000 hours per person per annum						
* Units for Accident Rate (AR) number per 100,000 workers						
** Col 5 divided by col 3 then x (x 2000 x 100,000)						
*** Col 4 + 5 divided by col 3 then x (2000 x100,000)						

## **ACKNOWLEDGEMENTS**

The assistance of IRATA staff in compiling, arranging and presenting data is gratefully acknowledged. Also recognised is the considerable effort of member companies staff who produce and submit the data required. This report could not be prepared without their collective effort.

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