

WORK & SAFETY ANALYSIS 2017



ABSTRACT

This report covers data for employment and accidents/incidents provided by IRATA members Jan-Dec 2016. IRATA membership rose to 353 by Q4, an increase of 20 members operating worldwide. Total employment fell slightly to 13,100, and associated work hours were reduced significantly to 18 million hours from 24 million hours in 2015.

Despite reductions, the number of technicians employed actually increased, particularly in L2 and L3 grades. The reduction in 'Other' grade employees was largely responsible for the fall in employment whereas the major reductions in work hours were reported for L1 and L3 technicians. The net effect was a reduction in utilisation, back to pre-2015 levels.

There were 108 reported events, of which 71 were dangerous occurrences, 36 were injuries or illnesses, only seven of which were reportable, and, sadly, a fatality. The reportable injury rate was 78 per 100,000 workers, well below all latest UK, Eurostat EU28 and USA work injury statistics, maintaining an excellent safety record for injuries. However, the single fatality contributed to an increase in the 5-year rate which was above the range of most other related data.

Areas where improvements in safety could be achieved were identified including training, rope handling (including rigging), working in hot/humid conditions and effectiveness of isolations.

The health and safety statistics, overall, continue to be a credit to members of the Association.

Dr C H Robbins

4 July 2017

All data refers to the period between January and December 2016

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The Industrial Rope Access Trade Association International (IRATA), formed in 1989, requires members of the Association to submit regularly employment, accident and incident data. This report presents summaries of the data provided during the period Jan-Dec 2016. Since 2013, members report under Regional Advisory Committees (RACs) that cover geographic areas or zones. The number of RACs has now increased to thirteen.

The report attempts to analyse the data submitted and to present comparisons of reportable accident rates against international figures. 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 required data on behalf of members and also to the IRATA staff who assembled and presented the data for analysis.

As previously noted, changes to help clarify and simplify the reporting format for both incident and employment data should have improved the accuracy of submissions with only marginal loss of content. However, as will be noted, there still appear to be transitional problems with some submissions. 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 will greatly exceed the numbers covered by this report.

Throughout the report, reference is made to the following categories of work location. These have been simplified and the revised distinctions are noted next:

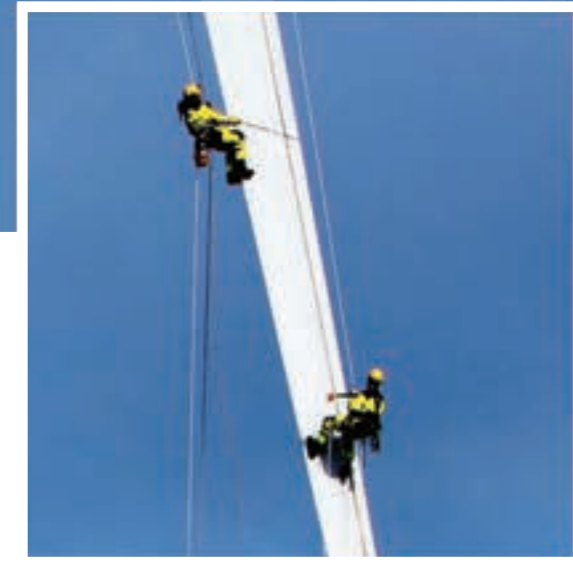
- **'On Rope'** – Arranging, using and directly involved in rope access work. It also includes access and egress activities to rope access work sites and setting up belays, rigging and de-rigging. Thus, this does not necessarily require a person to be 'roped up' or physically connected to active ropes. It may, for example, include setting up rescue equipment, work equipment (welding gear, inspection equipment) at the work site in readiness for immediate deployment on rope.

- **'Other'** – typically includes all other work, both on and off-site, in offices, etc. That is in support of rope access and related activities. For example, equipment inspection prior to removal to work site, logistics, storage, administration and standby duties (e.g. fire watching, surveillance and site security). '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. It excludes workers who are not involved in rope access activities.

- **'Training'** – all activities undertaken at rope access training facilities and establishments by trainees, including assessment. This now excludes all trainers and training staff for rope access training who will be reported under either of the above categories as appropriate. All other unrelated training, induction courses, trial work, specialist courses (e.g. use of breathing apparatus, first aid) are excluded and should be reported under 'Other'.

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

- **'Accident'** - an unintended event where actual personal harm, injury or fatality occurred at work. This will include sprains, strains, illnesses or ill health brought on by or made worse by work.



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- **'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 first summarises overall employment figures, then presents the employment data for each region (RAC). All accident and incident data is then analysed and compared to available international statistics. The report presents conclusions and also makes recommendations, based on the data supplied, to raise awareness of specific work issues of relatively high frequency and/or seriousness. Tables, summarising overall employment data, are included in appendices.

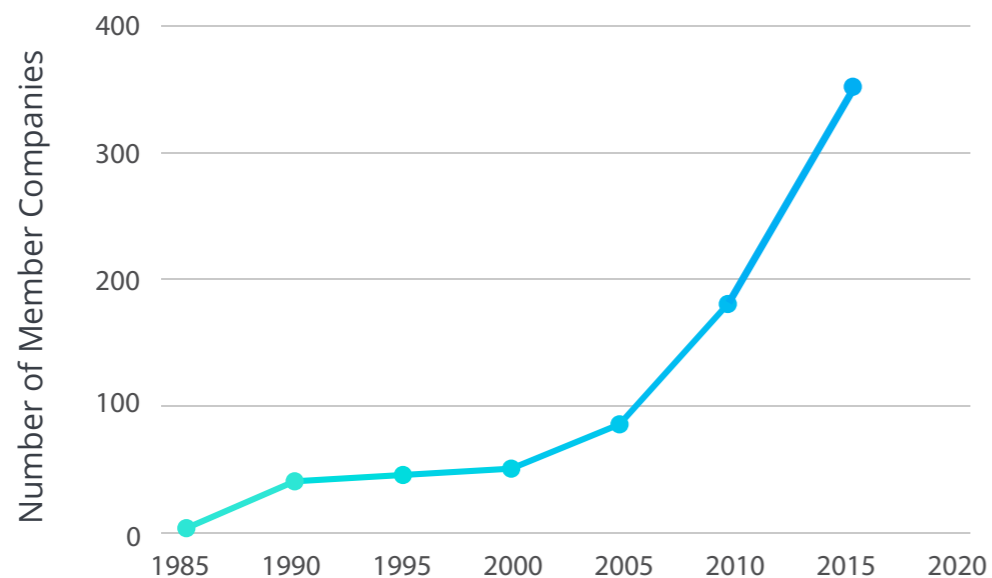
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IRATA MEMBERSHIP

The number of members reported by IRATA Head Office in 2015 was 356, whereas the Q4 membership, based on data submissions, totalled 333 as in the summary table provided in the 2016 report. The chart in Fig 1 is based on the same criteria, that of Q4 reporting members; this had reached 353 by Q4 2016, an increase of 23 from 2015. The change in membership since 1989 is shown in Fig.1.

A number of mergers and takeovers apparently have taken place over the year and this may have had a minor impact on the rate of growth of membership that, nevertheless, continued to rise. As will be noted later, the number of managers remained static. Minor reductions occurred in membership provided by Brazil, North Sea Operators, Other and South Africa whilst increased membership was reported in most others. However, the largest increases occurred with the newly created RACs, Mediterranean and Scandinavia who, between them, added a further 31 members. This probably accounted for some falls such as North Sea Operators and, particularly, the 'Other' RAC as members transferred from one RAC to a more appropriate newly created RAC.

Fig 1 • Membership at year end



EMPLOYMENT STATISTICS

3

3.1 Employment Levels

Fig 2, on the next page, shows average employment figures for 2016 against those for previous years. Significant increases occurred primarily in L2 and L3 numbers. (Note that the figures are taken as the average of the four quarterly figures submitted for the year).

Total Employment numbers, including trainers, were as follows (rounding errors):

2013	12,039
2014	11,849
2015	13,223
2016	13,100

Optimistically, the Fig 2 chart shows modest increases for L3 (~6%) and L2 (~8%) technicians whilst the number of managers appears static. The net change in L3s of ~ 6% may be indicative of an expected increase based on ~10-20% of L2s per annum seeking promotion to L3. This would be balanced by some loss of L3s due to natural wastage and promotion to manager status. Similarly, the increase of L2s would be net a result of losses to L3 and gains from L1. The virtually static or declining L1 numbers may inhibit expansion of the industry in the long term unless recruitment is accelerated to make up a foreseeable deficit.

The significant fall in 'Other' category employment is primarily responsible for the apparent reduction in reported workforce overall. It should be noted that in 2014 and 2015, excessive reports of 'Other' category workers were submitted by some members. This now appears to have been largely rectified. Therefore, the fall in overall employment does not reflect the true situation with respect to technician employment (L1-3) which had risen from 10,988 to 11,260.



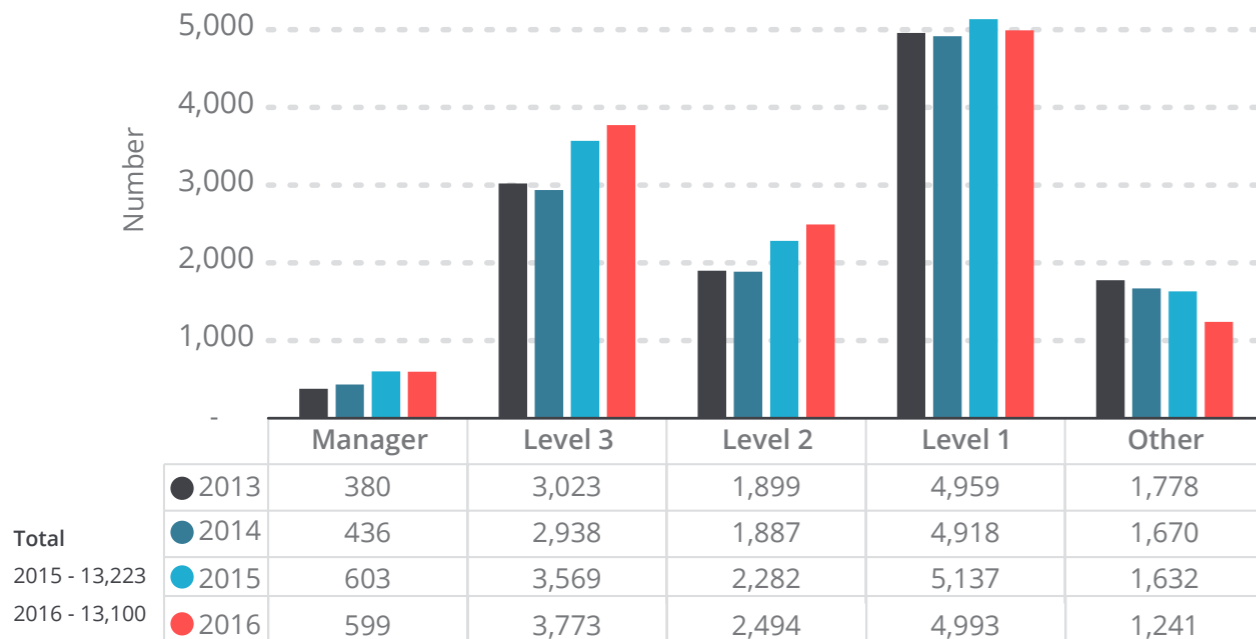
PHOTO BY YUKSEK ISLER HIGHWORKS LTD

3.2 Hours Worked

The number of total hours worked in 2016 was 18,091,456 or approximately 18 million. This was a substantial decrease of over 20% over the reported figure of 23 million in 2015. Fig 3 shows the worked hours for each grade for both years.

The falls in working hours for all grades is most apparent for L3 (1.2 million) and, particularly, L1 (2.6 million). Although each individual RAC will be considered later, it may be useful to present comparative figures at this stage to demonstrate that the downturn in overall work hours was not a universal reflection of the industry. The data is best presented visually (Fig 4 - next page).

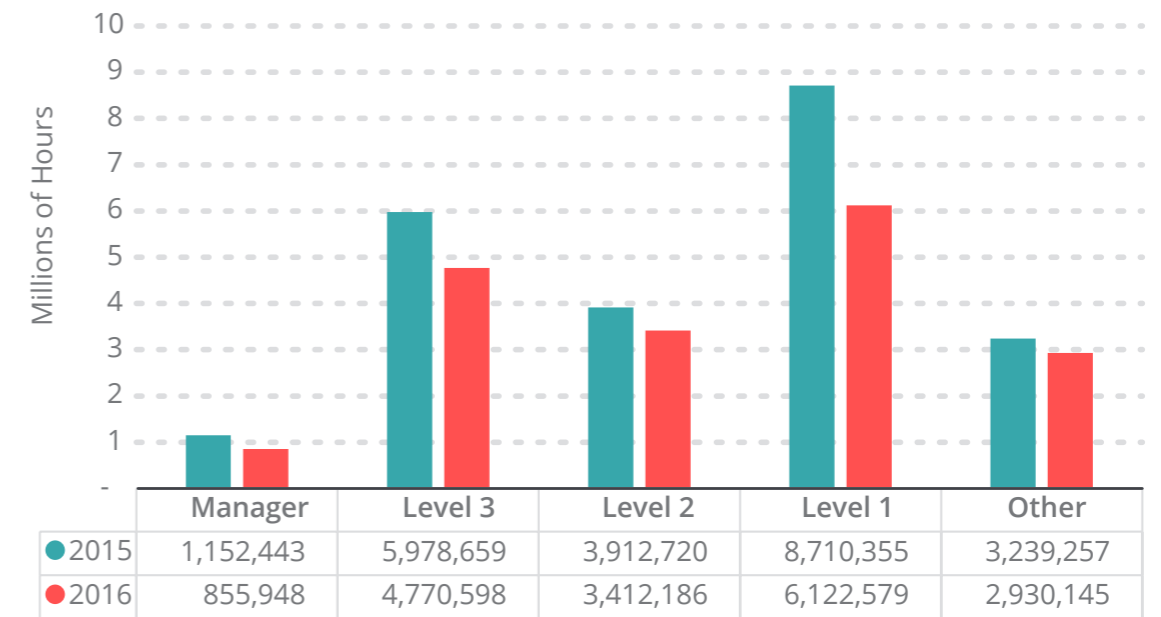
Fig 2 • Employment by Grade



(Note that quarterly employment figures must be averaged)

The average ratios of qualified technicians were, almost precisely: L1: L2: L3 = 4: 2: 3. In effect, each L3 was responsible for two technicians. RACs and individual members may wish to compare their figures with these ratios.

Fig 3 • 2015/ 2016 Work Hours by Grade



The chart shows variations between RACs with Brazil, South Africa, SE Asia and UK as the major contributors to the reduction in work hours reported in 2016. Other RACs show positive change or negligible impact on overall figures. Some minor reductions may be due to relocation of members to the newly created RACs, Scandinavia and Mediterranean.

Fig 4 • Comparison of RAC Contributions to Work Hours 2015/2016

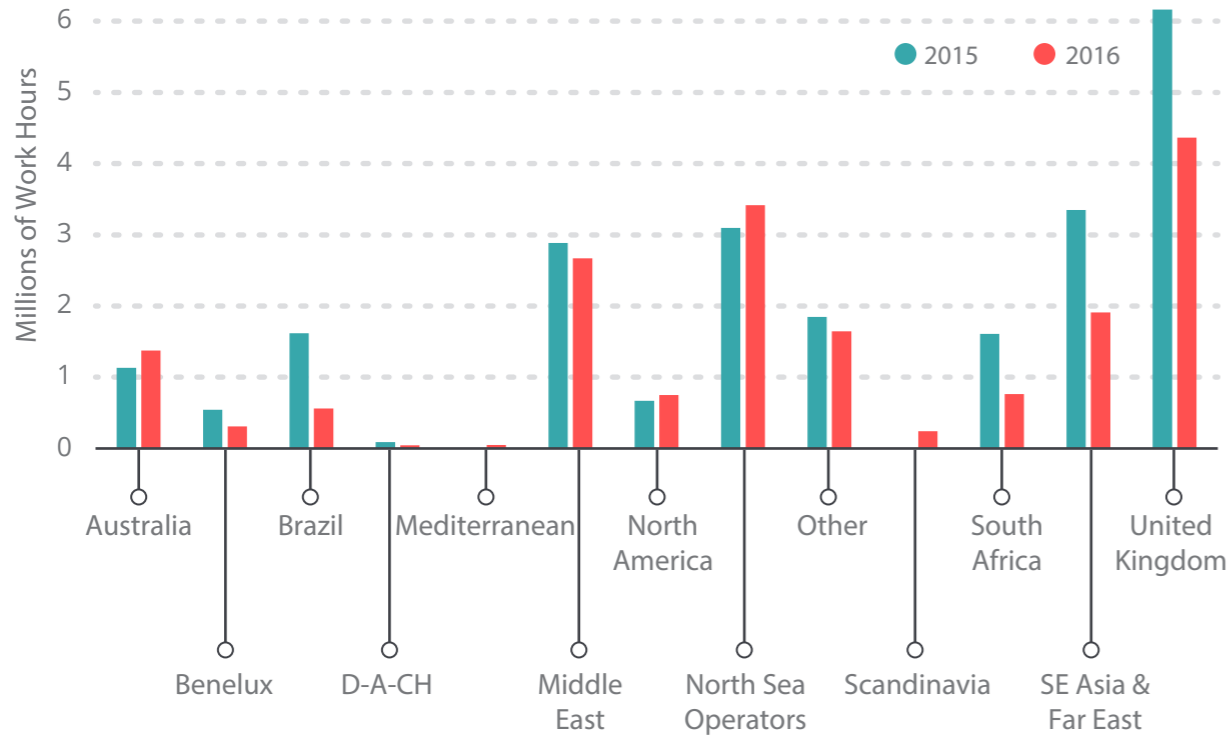
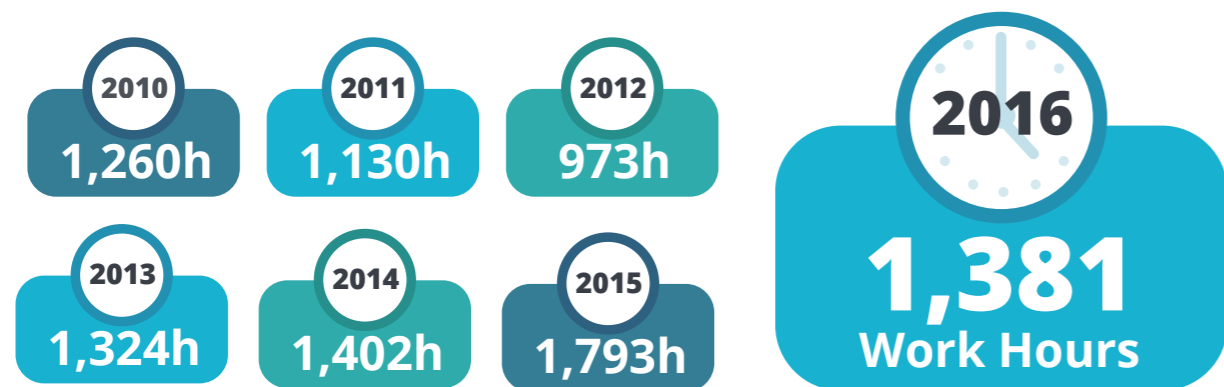


PHOTO BY CAN UK GROUP

Taken together with the significant reductions in L3 and L1 work hour figures, subsequent examination of individual RACs should confirm these trends. The variation in data for individual RACs demonstrates that the reduction in work hours was not due to a systematic problem such as changes in the way employment hours were reported or recorded in 2016.

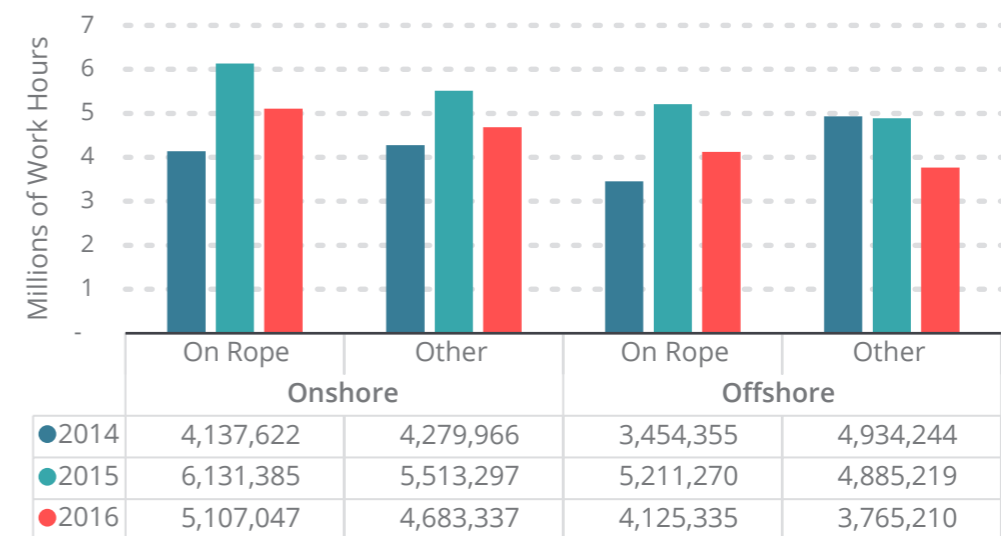
The overall utilisation (hours worked divided by number of employees) has usually been well below maximum, which is based on 2,000 hours per employee per annum. The table below summarises utilisation over the last few years together with the 2016 figure. The return in utilisation for 2016 to previous historical values is apparent. Individual RAC figures will be presented later.



Turning now to the location of work hours, Fig 5 compares the distribution of work hours between onshore and offshore over the previous years (excluding training).

The mirrored trends for 2015 and 2016 figures are immediately obvious in the chart (Fig 5). As in 2015, 'Onshore' working of 11.6m significantly exceeds the 9.8m for 'Offshore' working. Total 'On Rope' working of 9.2m exceeded 'Other' work hours of 8.4m. These figures omit training which will now be examined.

Fig 5 • Work Hours by Location



3.3 Training

The Association places great emphasis on training; it remains a cornerstone for safe working practice. The data collection system was changed in 2015 and again in 2016 in attempts to clarify and simplify data submission requirements. Data is now only collected for trainees on rope access courses and assessments. Hours spent by trainers instructing and testing candidates is included within overall work hours. It is emphasised that other training courses, unrelated to rope access, should be reported under 'Other'. Thus, the training referred to here will only cover rope access training undertaken by trainees and, therefore, training figures for 2016 cannot be compared to 2015 figures. Table 1 summarises the training data submitted for each RAC.

The total of hours reported for training was 410,527 which is approximately 2.2% of the 18 million work hours. Given ~13,000 technicians, this equates to approximately 31 hrs training for each technician during the year. Nevertheless, this is in line with the historical figure of approximately 4% spent on training which previously included 'trainer' hours.

One other implication of the discrepancy is that some members may have submitted 'trainer' hours within 'training hours'. To test this, each RAC was examined and the 'training hours per employed' calculated. The results show a variation from 5 to 119 against an average of 31 hours per person. This implies that some either spent significantly more on training or had included 'trainer' hours.

The overall figures confirm and reflect the emphasis IRATA members generally place on the importance of training. Finally, if the training hours are added to work hours the overall hours for 2016 rises to:

Work Hours	18,091,456
Training Hours	410,527
TOTAL HOURS	18,501,983

This is the figure that will be used in subsequent calculations of accident and incident rates, along with the 'population' of 13,100.

3.4 Regional Advisory Committees (RACS)

In 2012, it was decided that nine zones or regions around the world, each overseen by Regional Advisory Committees (RACs), be formed. This has since been increased in steps and in 2016 reached 13. Members submit their data according to the zone or region in which they operated. The 13 RACs identified are as follows:



It is now necessary to consider the returns from each of these RACs. Their respective data is presented in chart form, covering employment numbers against grade, distribution of work hours by grade and location (Onshore/Offshore and 'On Rope'/'Other'), noting the combination of 'Off rope' with 'Other' hours for previous years to coincide with the 2016 figures. It should also be noted that location hours exclude training hours and, hence, location totals will be less than employment hours. Direct comparison with previous years may not always be correct because of RAC changes.

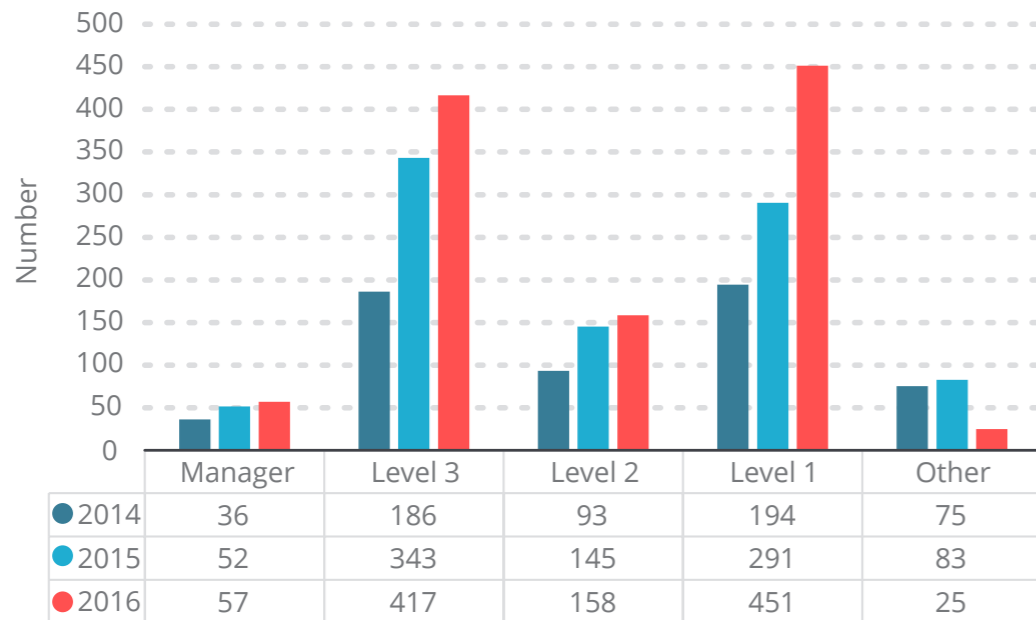
Not uncommonly, there were instances of significant reductions in utilisation. It is surmised that, in most such cases, technicians involved may have alternative employment unrelated to rope access. This would particularly be the case for those with specialist skills.

Training hours, extracted from employment hours, are given in text for each RAC. It may be helpful when examining the training data to be aware that the average training overall was approximately 31 hours per annum per employee.

3.4.1 Australia

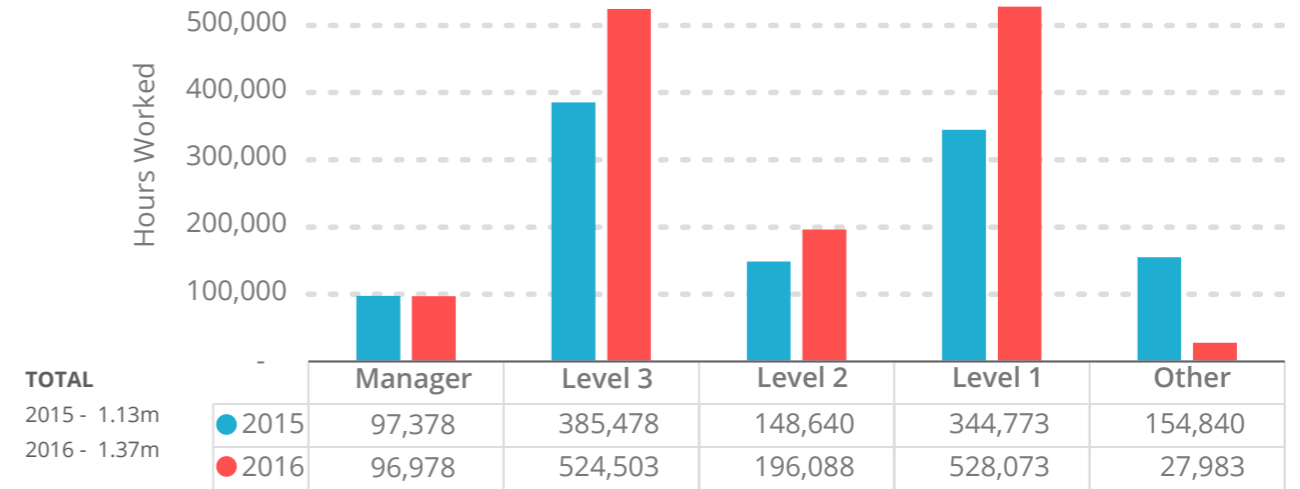
Returns for work in Australia were submitted by 29 members with one company dominating and three others contributing substantially to the totals. Average employment totalled 1,108 showing a consistent continuing rise over the last three years. Quarterly figures were erratic, largely due to fluctuating figures from the main contributors. Of particular note was a markedly high spike in L1 employment for Q3, reflected in the summary chart below. The significant rise in L1 technicians bodes well for the future. The relatively low proportion of 'Other' workers may be noted.

Fig 6 • Australia
Employment by Grade



Work hours totalled 1.37m, some 0.24 higher than the previous year and dominated by the L1 and L3 contributions. Utilisation remained virtually constant at 1,240 hours per worker, slightly less than the average 1,381. Fig 8 shows that the increase in work hours over previous years was due to an increase in onshore working 'On Rope' of more than 37%, presumably largely due to L1 and L3 effort.

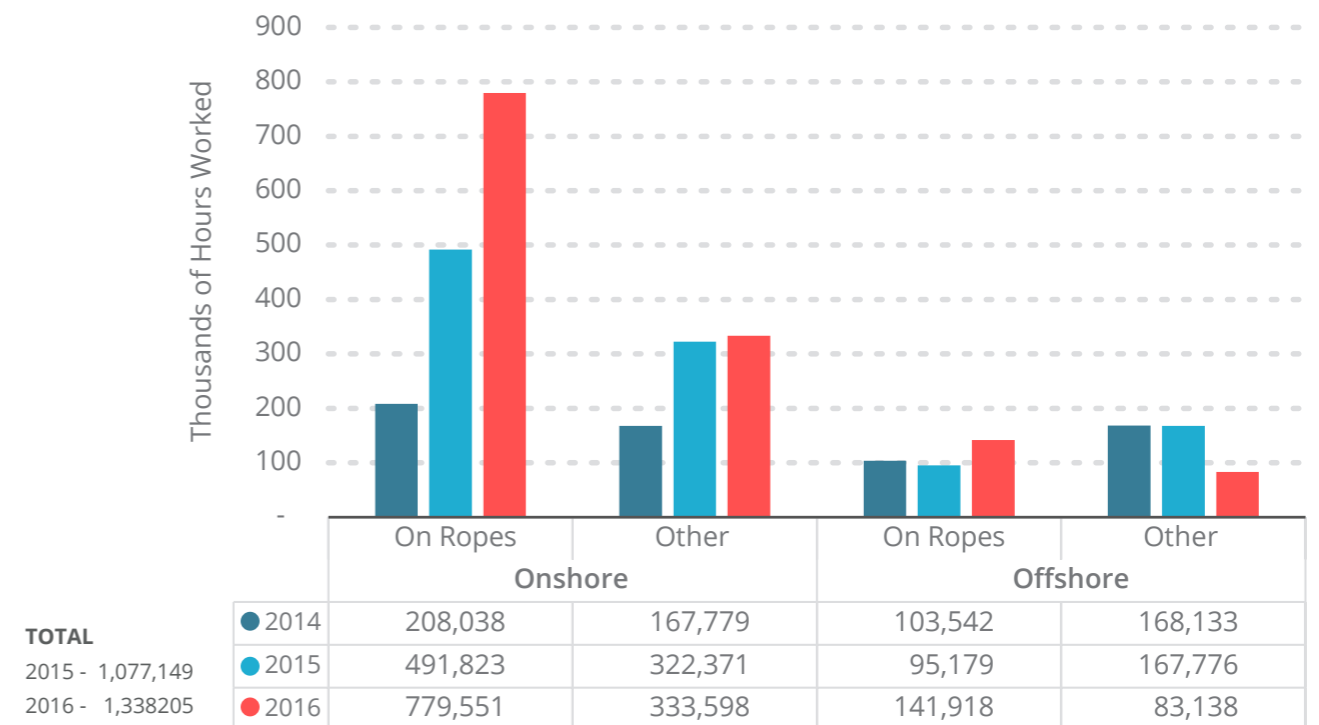
Fig 7 • Australia
Hours Worked by Grade



Training hours totalled 35,420 which equates to approximately 32 hours per employee, almost exactly the same as the average figure of 31.

In summary, Australia maintained a continuing rapid increase in both employment and work hours in 'On Rope' onshore working but with little change in total offshore working.

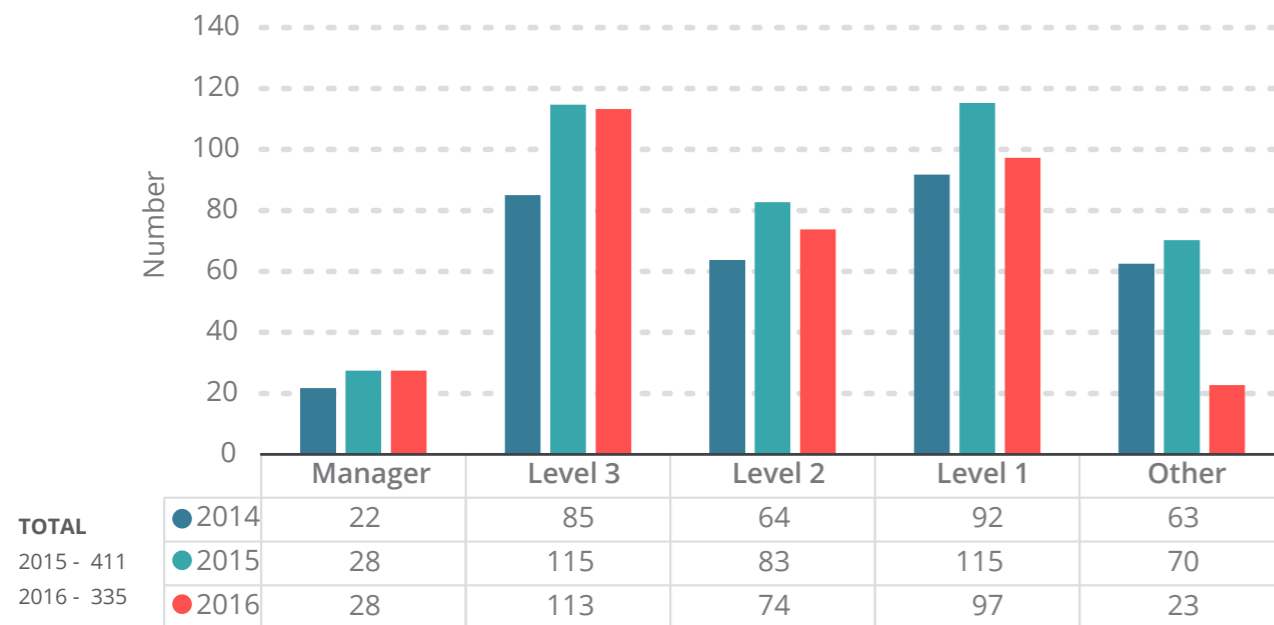
Fig 8 • Australia
Hours Worked by Location



3.4.2 Benelux

Total employed for Benelux in 2016 fell from 411 to 335 but the majority of the reduction was in the 'Other' category as may be seen in the chart (Fig 9). The quarterly variations were modest and derived from up to 17 (13 in 2015) members with an even distribution of employment between them i.e. no dominating members.

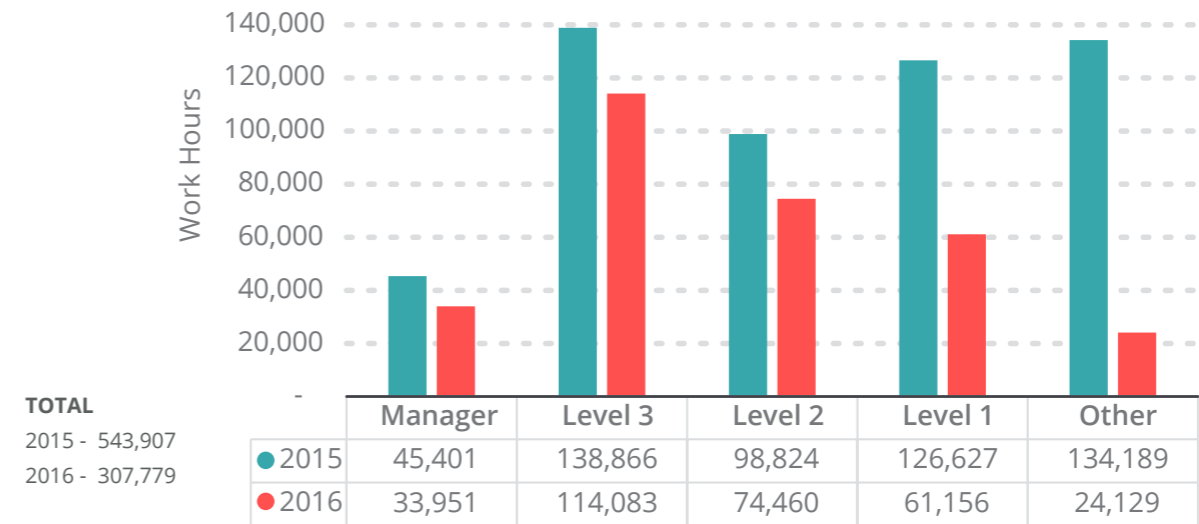
Fig 9 • Benelux Employment by Grade



Despite the increase in membership, the falls in all work hours for all grades may be noted, in line with reductions in employed numbers. The falling trend in work hours was previously identified in Q4 figures in 2015 which were significantly lower than Q1-3 figures in the same year. The dramatic fall of approximately 110,000 in 'Other' worker hours contributes nearly 50% to the reduction of 236,000 hours or 43% fall in overall work hours.

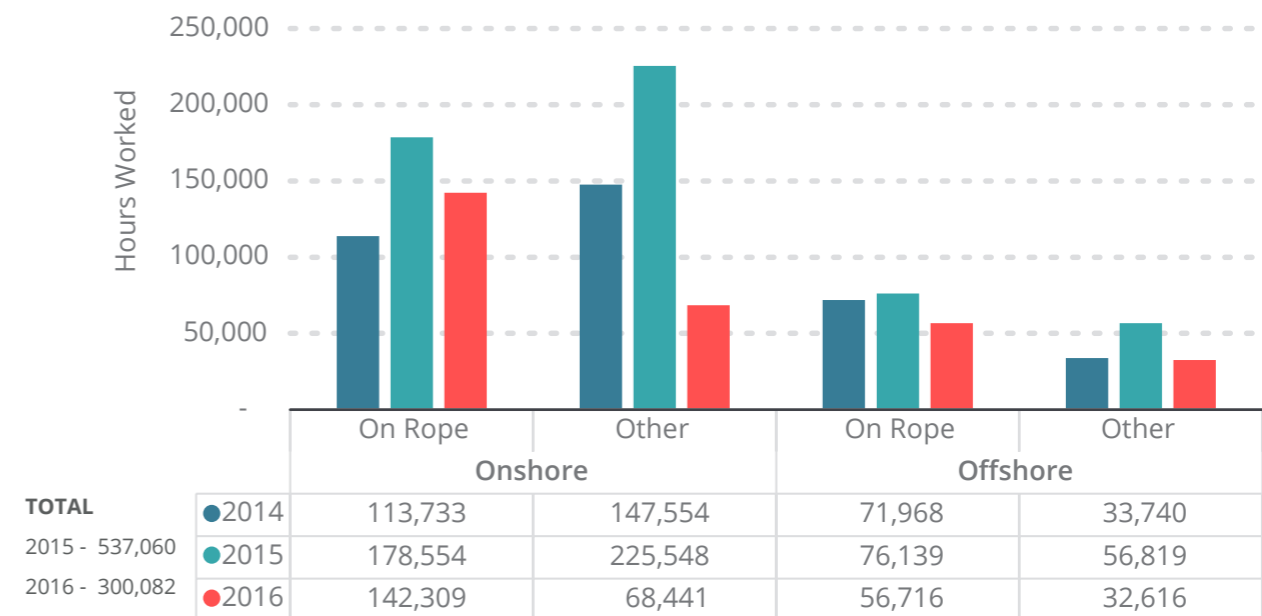
The fall in L1 work hours is reflected in the utilisation of not much more than 600 hours per annum for L1 technicians, reversing the trend from 2014 to 2015. Utilisation overall fell from 1,327 in 2015 to only 919 hours per employee in 2016.

Fig 10 • Benelux Hours Worked by Grade



In Fig 11 the distribution of work hours shows the emphasis on onshore 'On Rope' working but with the large reduction in onshore 'Other' working, falling well below even 2014 levels. This implies that there was little reduction in actual 'On Rope' work but with very much reduced supporting effort. Offshore work was only marginally reduced. All 'On Rope' working (199,025) virtually doubled 'Other' working (101,057), thus confirming the continuing level of rope work and that the overall reduction in work hours was primarily due to reduced 'Other' working. Training hours totalled 7,697 which equates to approximately 23 hours per employee; this is marginally less than average and perhaps reflects the small falls in technician numbers.

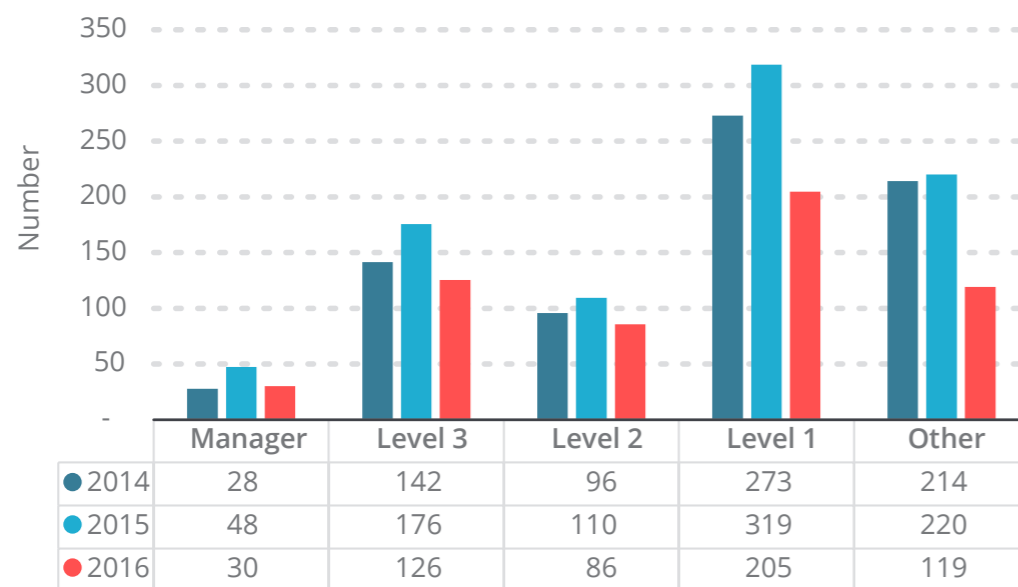
Fig 11 • Benelux Hours Worked by Location



3.4.3 Brazil

Submissions were received from 21 members with 5 members presenting the majority of data. Fig 12 shows that employment fell significantly from 871 in 2015 to 566 with significant decreases across all grades particularly L1 and 'Other' grades. The reductions in technicians bring them back to below 2014 figures, unfortunately with major losses in L1 technicians.

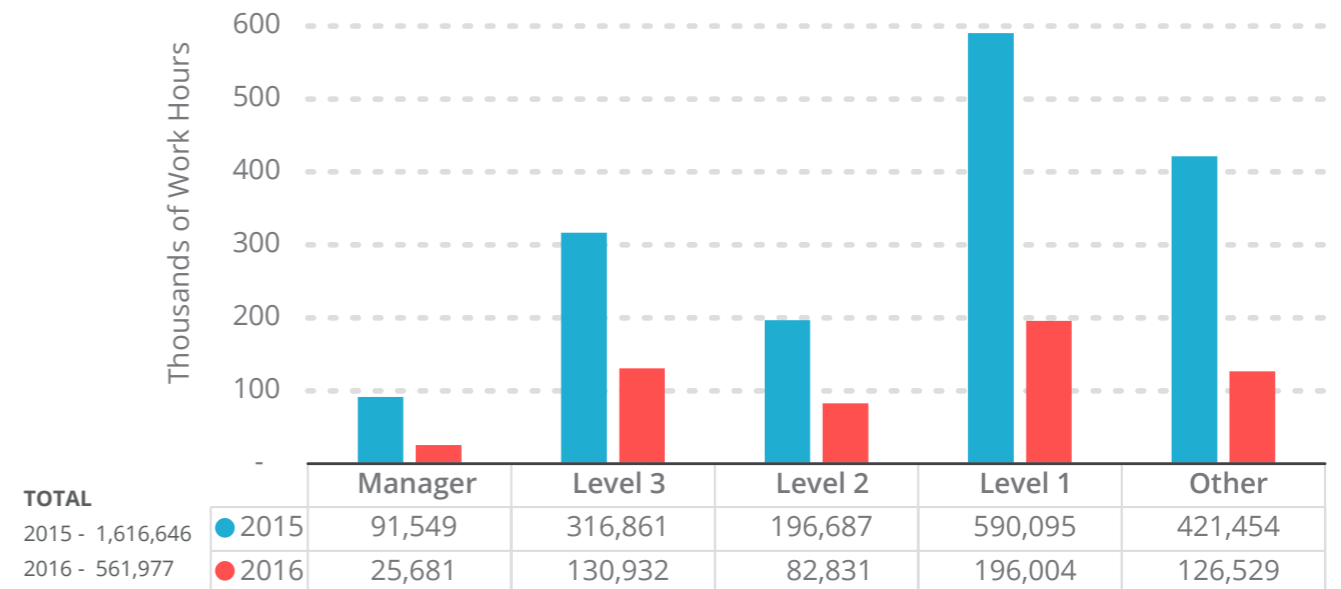
Fig 12 • Brazil
Employment by Grade



The loss in all grades is more than matched by the loss in accompanying work hours as the chart in fig 13 shows. The net effect is a virtual halving of the utilisation, falling from 1,856 to only 993 hours per employee and even less in the case of L1s (956). Total work hours had fallen from 1,616,646 to only 561,977, well below even the 806,085 work hours recorded in 2014. This loss of over 1 million hours and an employed loss of nearly 300 make a significant impact on the overall IRATA figures.

The reduction in work hours is evenly distributed across all locations as shown by Fig 14, with the distribution profiles very similar, albeit much reduced.

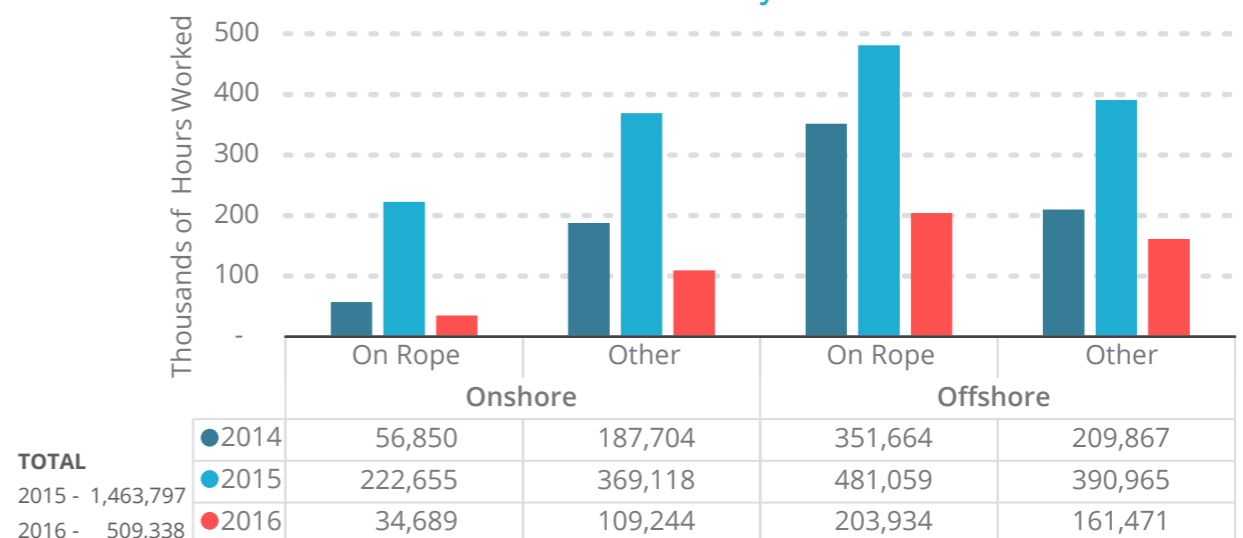
Fig 13 • Brazil
Hours Worked by Grade



Specific causes for these much reduced figures cannot be identified purely from the data. Quarterly figures for both employment and work hours showed relatively consistent submissions by all major contributors. So, there was no obvious explanation such as loss of major contributors or data errors, omissions or faults. This suggests that the causes may lie within the RAC work environment itself. Offshore working still accounts for the majority of work hours but at a much reduced level. Onshore work reduced to a level only ~50% of even 2014 figures.

Training hours reached 52,639, unrealistically suggesting 93 hours per employee for the year. One explanation may be that 'training' members have submitted training hours for trainers and/or for trainees whose training hours would have been submitted by trainees own company (i.e. double count) or for trainees who were independent and not within the IRATA membership.

Fig 14 • Brazil
Hours Worked by Location

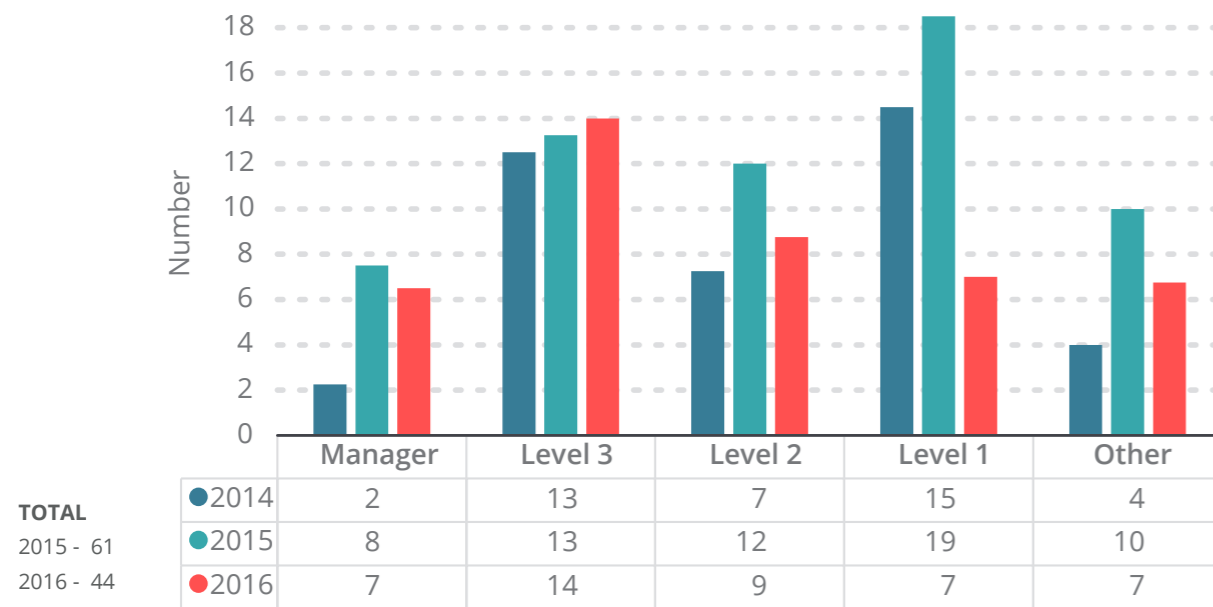


3.4.4 D-A-CH Germany, Austria & Switzerland

Although numerically a relatively minor contributor to overall figures with only five members and 44 employed, D-A-CH reflects the reductions in employment and associated work hours, all of which is associated with onshore work.

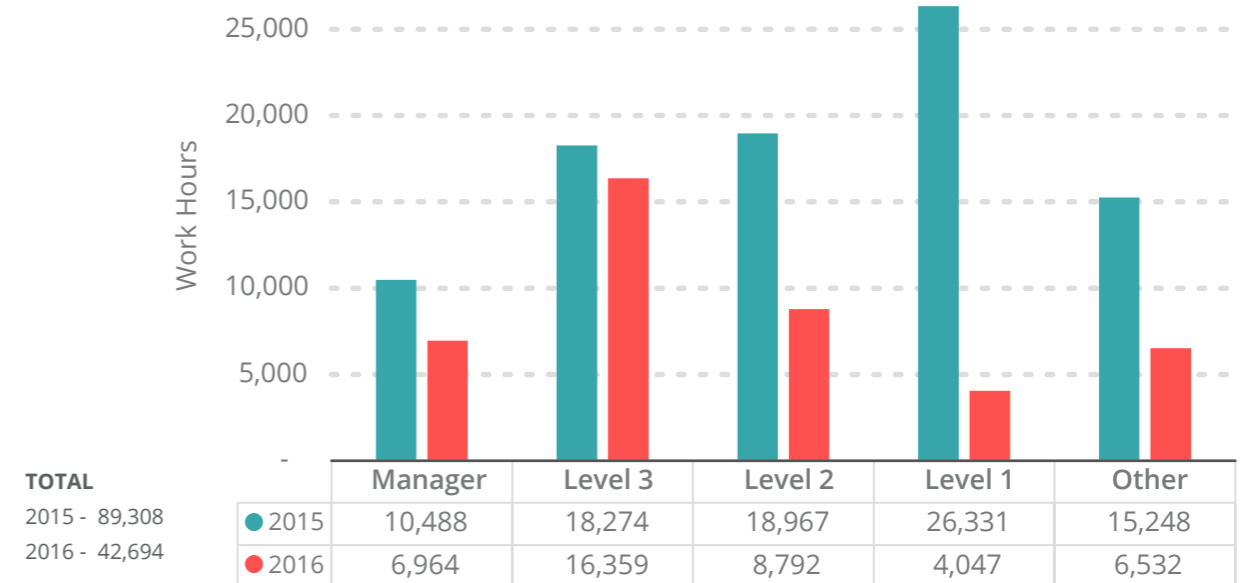
It should be noted that the almost single figure employment numbers for the various grades means that even individual gains and losses will have marked effects on the chart in Fig 15.

Fig 15 • D-A-CH
Employment by Grade



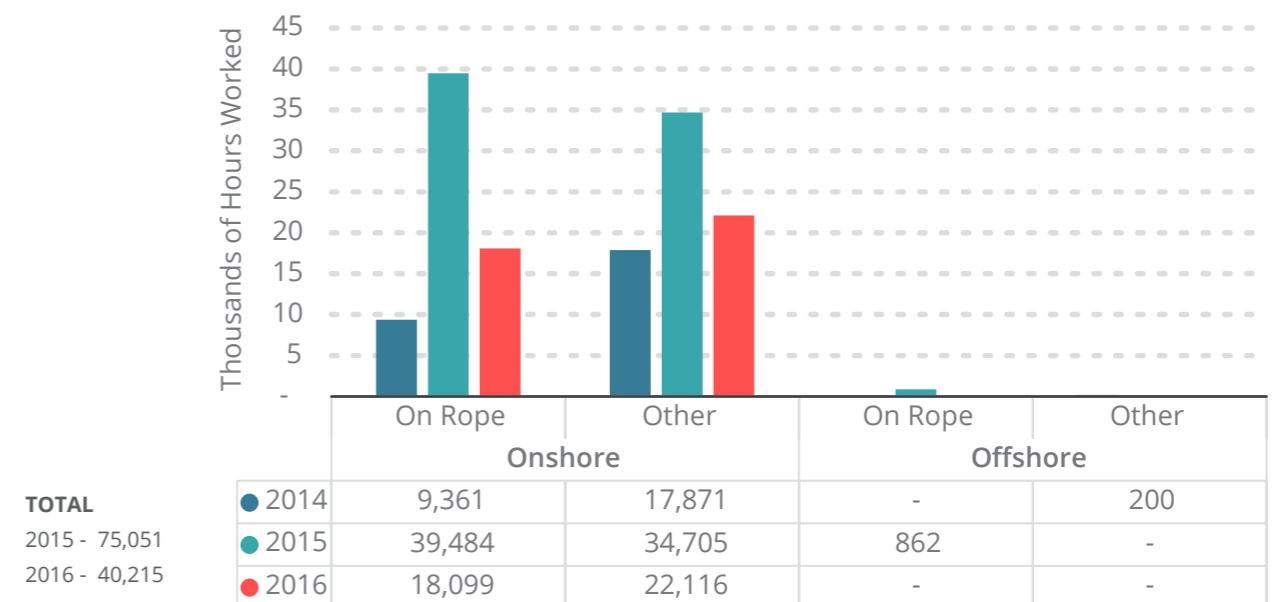
Nevertheless, the much reduced number of L1 technicians is clear. The reduced L1 and L2 numbers has also resulted in large drops in work hours for these two technician groups, as Fig 16 clearly shows. The reduction in L1 work hours is particularly significant giving a utilisation of only ~580 hours per L1. Total work hours had fallen from 89,308 in 2015 to 42,694. Utilisation had, therefore, fallen to only 970 hours per employee overall from the previous figure of 1,464.

Fig 16 • D-A-CH
Hours Worked by Grade



In Fig 17 the fall in 'On Rope' working, relative to 'Other' may also be noted, returning to the situation in 2014. On a more positive note, 'On Rope' working nearly doubled the 2014 figure yet with a smaller workforce of qualified technicians. Training for D-A-CH totalled 2,479 hours or 56 hours per employee, nearly double the average. This is in common with 2015 figures.

Fig 17 • D-A-CH
Hours Worked by Location





3.4.5 Mediterranean

As a newly created RAC, Mediterranean has no previous data for comparison purposes. Membership rose quarter by quarter from 6 to 9 during the year. Fig 18 shows the employment reported averaged 55 but the quarterly numbers increased during the year from 32 to 88 by Q4, in line with membership increase.

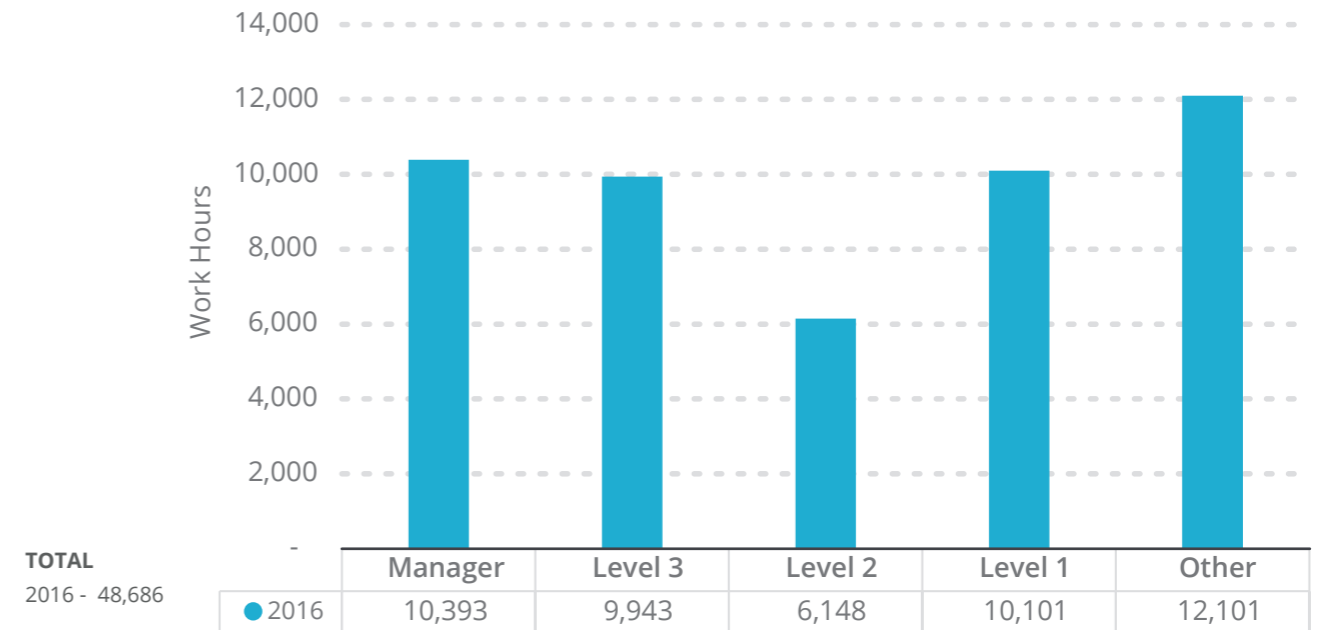
Fig 18 • Mediterranean Employment by Grade



The work hours only partially reflect the employment data as comparison between Fig 18 and Fig 19 reveal. However, the average values shown do not reveal that there was a steady rise in work hours recorded, quarter by quarter, for the technician grades which increased as follows:

- Level 3** – 1,436 for Q1 rising to 4,070 in Q4
- Level 2** – 863 for Q1 rising to 2,130 in Q4
- Level 1** – 1,765 for Q1 rising to 4,358 in Q4

Fig 19 • Mediterranean Hours Worked by Grade

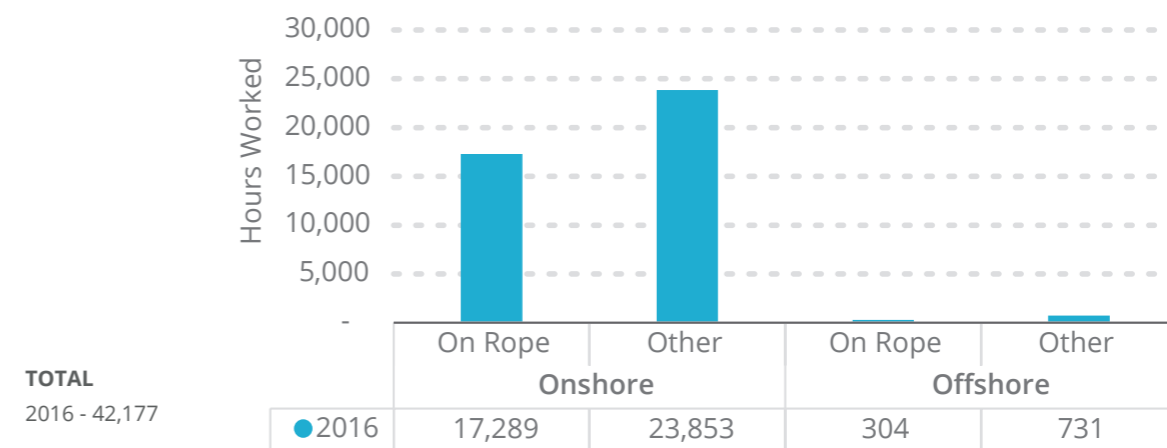


Total work hours reported reached 48,686; this equates to a utilisation of 885 hours per employee but the utilisation for each grade varied from approximately 720 (L1) up to ~ 1,340 for 'Others'.

Fig 20 shows that most of the work was carried out onshore. Given the ratio of L1-3 work hours compared to that for managers and 'Other', it is not surprising that the 'On Rope' hours are somewhat less than 'Other' hours.

Training accounted for an additional 6,509 hours or 118 hours per employee, well beyond a realistic figure. Examination of individual submissions suggests that several entries probably included training hours for trainers and unrelated staff or training of individuals not employed by a member.

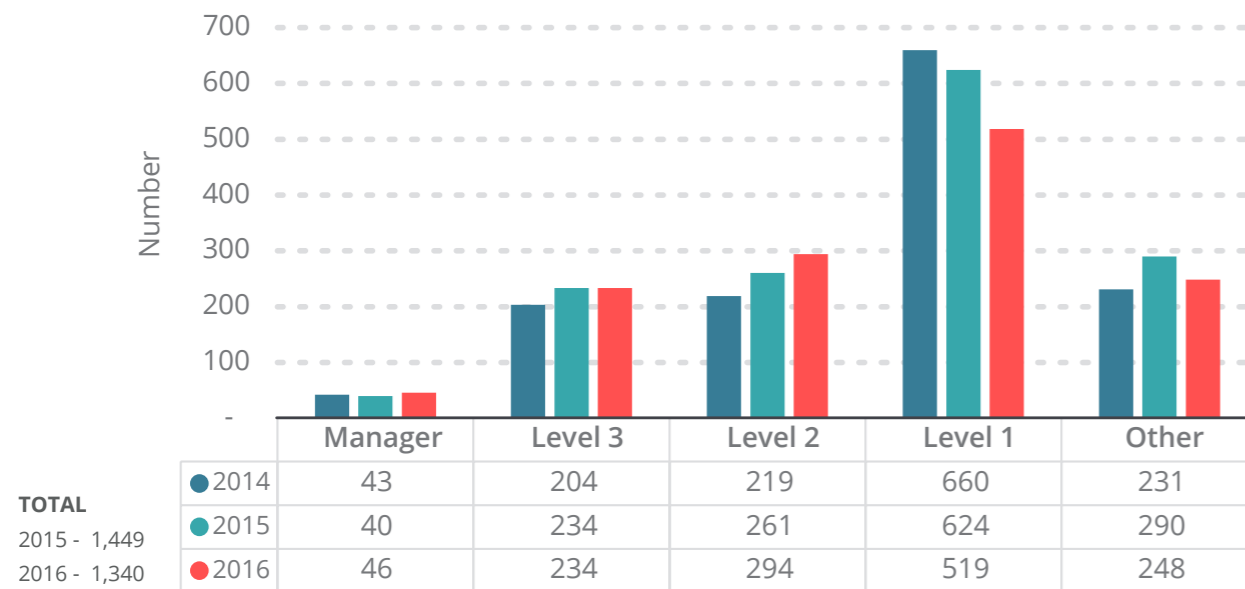
Fig 20 • Mediterranean Hours Worked by Location



3.4.6 Middle East

Although there were 22 members at Q4 in this RAC, a single company accounted for approximately half of all figures. Total employment, in Fig 21, averaged 1,341, a small reduction from the previous year of 1,449 employees, and virtually returning to 2014 figures. The only significant fall was in the number of L1s with a loss of 105. Some of this 'loss' may have been promotions to L2 which rose by 33. However, the continuing loss of L1s over the last three years, with increases in L2s of only 75 and L3s of 30, implies a virtually static workforce. Thus, up-grading promotions are not being supported by additional recruitment at L1.

Fig 21 • Middle East Employment by Grade



Associated work hours (Fig 22) marginally decreased, from 2,883,359 in 2015 to 2,668,281, a reduction of only 0.4%. The majority of this fall was due to L1 hours but, notably, the utilisation for this grade remained high at 1,920 hours per L1 and only marginally below the average. Thus, the small reduction in employment was balanced by a reduction in work hours such that the overall utilisation remained virtually the same as in 2015 at 1,991, close to maximum.

Fig 22 • Middle East Hours Worked by Grade

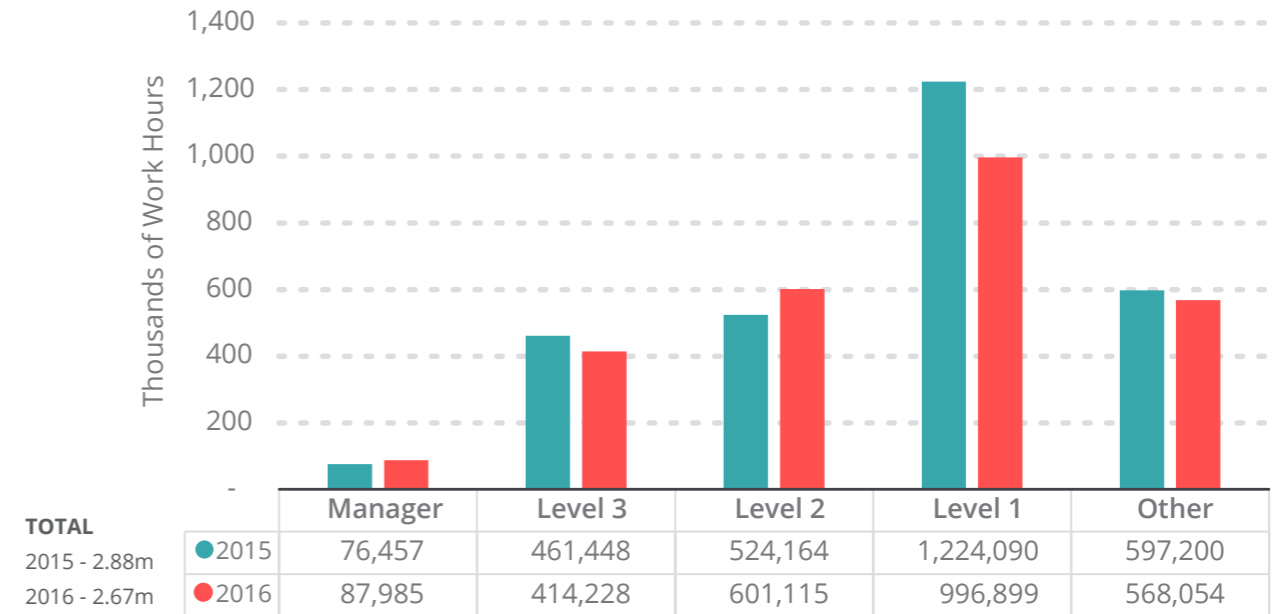
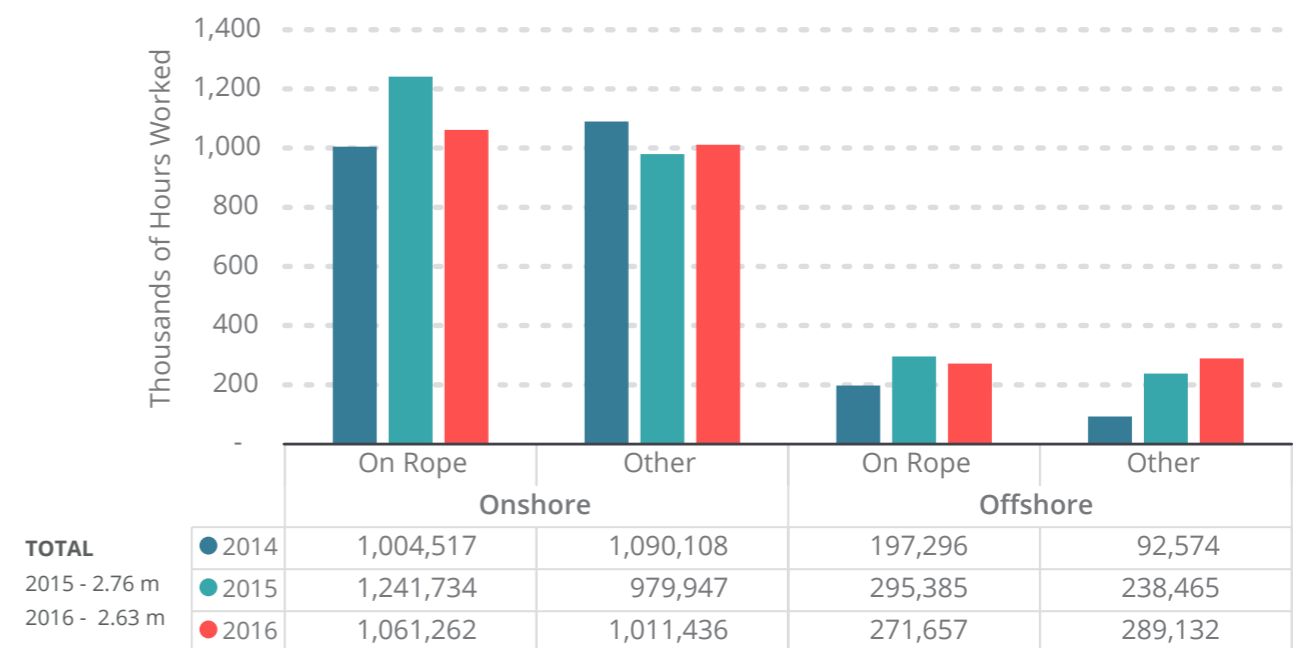


Fig 23 shows that little change has occurred in the distribution of work hours by location with onshore working dominating being roughly four times that of offshore. The only significant decrease (~6%) occurred in 'On Rope' working onshore.

Training hours for employees totalled 34,794, which averages approximately 26 hours per employee, in line with the average of 31. This is somewhat surprising in view of the modest changes in qualified technician numbers.

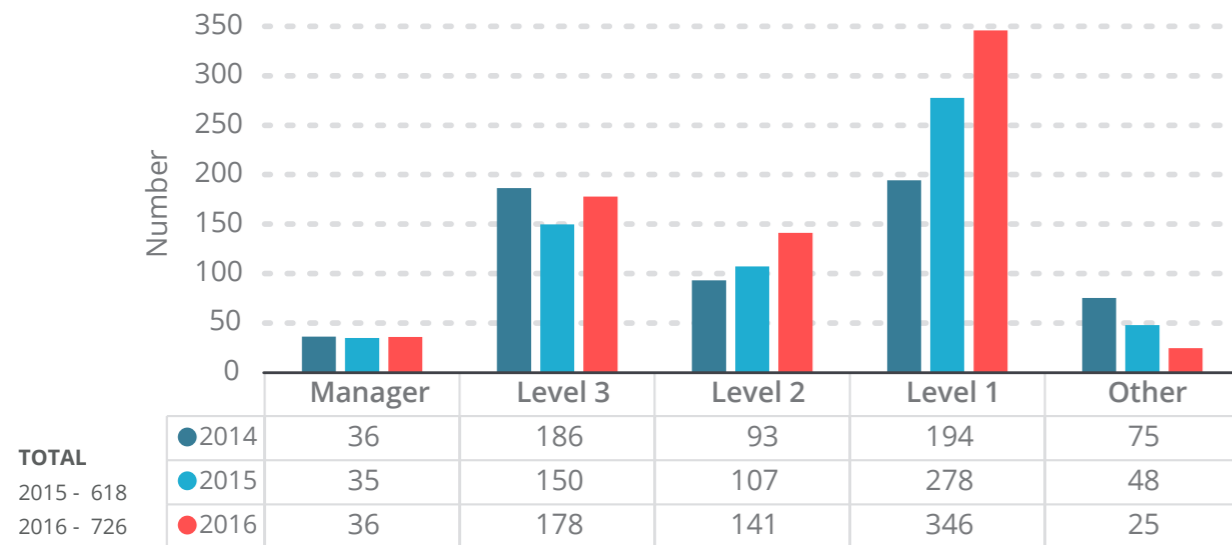
Fig 23 • Middle East Hours Worked by Location



3.4.7 North America

Member companies increased marginally to 19 in Q4. However, previously, one member was responsible for well over 50% of all employment and work hours and this situation continued in 2016. The employment profiles in Fig 24 show substantial increases for all technician grades (L1 to L3). The only reduction in employment occurred in 'Other'.

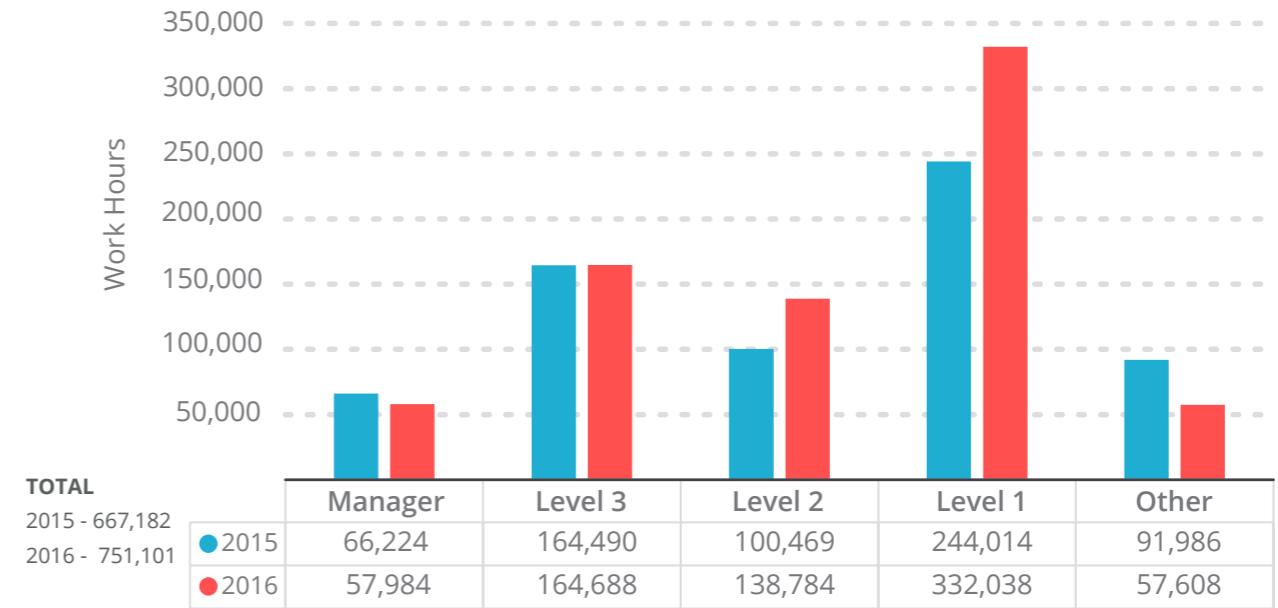
Fig 24 • North America
Employment by Grade



The net result was a substantial increase in employment, rising from 617 to 725, a 17% increase overall, with the highest gain in L1 numbers. This number may be even greater if it is assumed that the bulk of the L2 increase (34) was due to L1 promotions (and so on to L3).with the major gain only for L1 technicians. The virtually static number of L3 technicians appears to coincide with a 50% reduction in offshore working, but offset by increase in onshore working (fig 26).

Total hours worked was 751,101, a significant increase over the 667,182 in 2015, though only 11%, somewhat less than the 17% increase in employment.

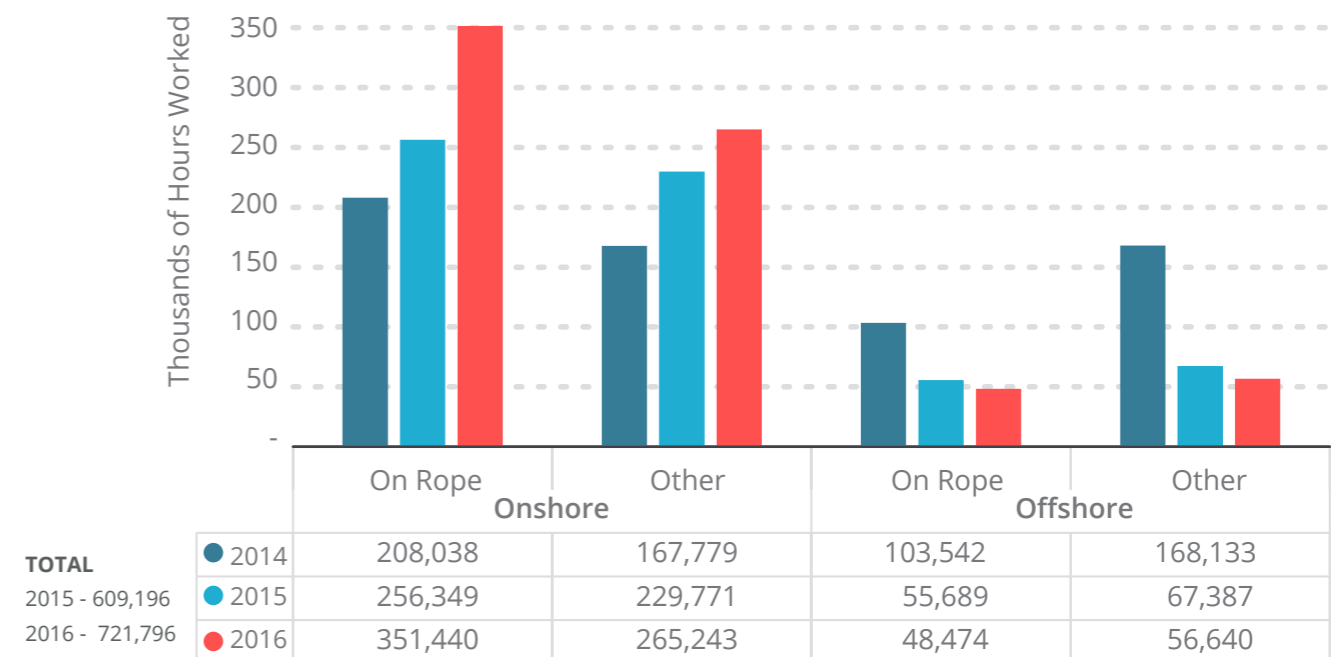
Fig 25 • North America
Hours Worked by Grade



This results in a small reduction of utilisation from 1,081 hours per employee per annum to 1,036. The increase in work hours is largely due to increases for L1 and L2 technicians but the utilisation for both grades still fall below 1,000 hours per employee per annum.

The increase in work hours and employment coincides with increases in onshore working (Fig 26), notably 'On Rope' and, therefore, presumably undertaken by L1 and L2 technicians. The continuing increase in onshore working is clearly evident. Training hours totalled 29,305, averaging approximately 40 hours per employee for the year, more than the average of 31.

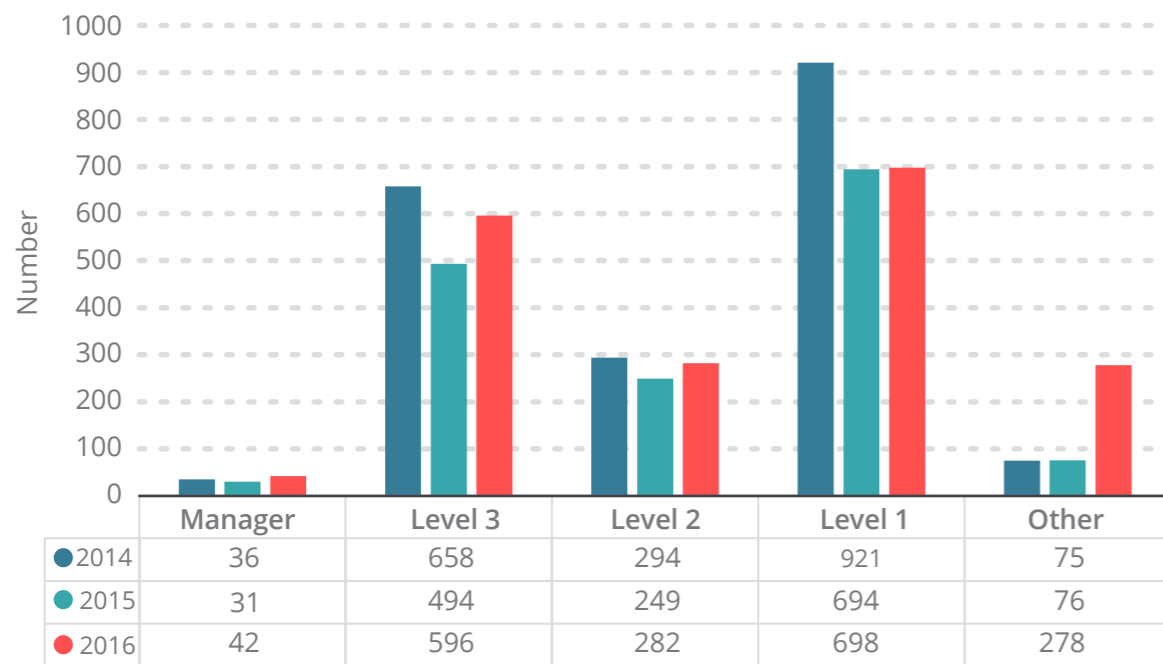
Fig 26 • North America
Hours Worked by Location



3.4.8 North Sea Operators

The number of North Sea Operators members continued to fall, ending in Q4 with 17 from a Q1 figure of 21. Submissions were dominated by one member but there were some queries with the data submitted, as will be apparent. Four other members presented substantial figures. Fig 27 shows the distribution of the workforce which increased from 1,543 in 2015 to 1,896, almost returning to the 1,984 of 2014. But, the increase was largely due to possibly questionable increase in 'Other' grade employees. However, examination of quarterly figures does show a consistent level for the grade.

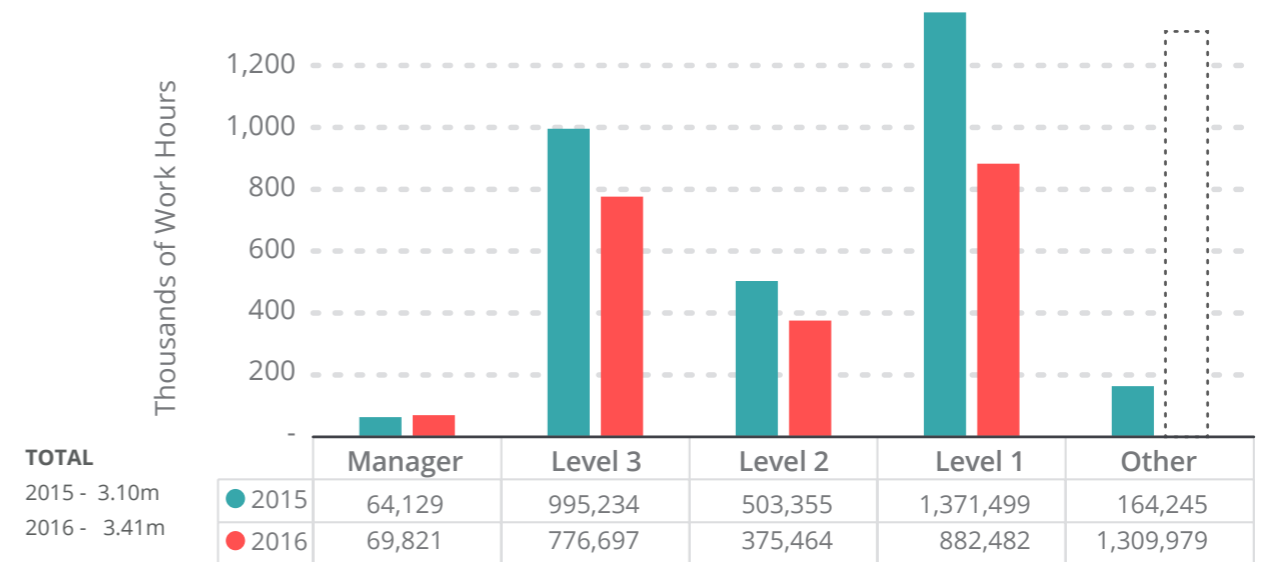
Fig 27 • North Sea Operators Employment by Grade



The virtually constant number of L1s for the last two years is evident yet there were significant increases in L2 and L3 that, presumably, were a result of promotions from lower grades. Also of note, is the relatively large increase in managers, which, nevertheless, remains low at 42 for a workforce approaching ~2,000. The modest level of managers, as before, may be explained by the tendency for offshore teams to come under local platform management.

Fig 28 charts the work hours by grade. It is immediately obvious that the work hours for 'Other' (shown in white) are well in excess of that expected or realistic for the number of employees. This 'distortion' was a result of figures presented by a single (and dominant) member. It is suspected that the hours should have been apportioned across L1-L3 figures which all show somewhat lower work hours than the employment figures would indicate.

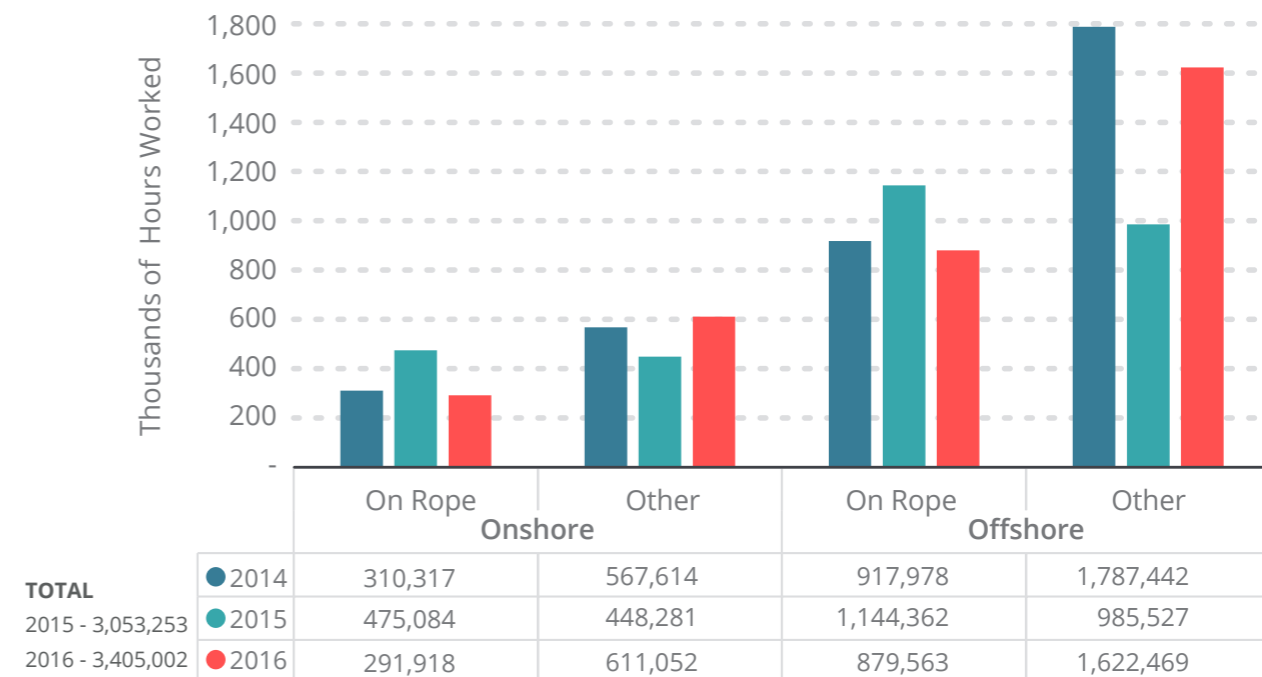
Fig 28 • North Sea Operators Hours Worked by Grade



Irrespective of these concerns over distribution, total work hours reached 3,414,44, a significant increase over the 2015 figure of 3,098,462, but the associated utilisation fell from 2,008 in 2015 to perhaps a more realistic 1,801 hours per employee because of the enhanced employment level.

The distortions indicated probably also impact on the distribution of location hours, in particular with respect to the relatively high offshore 'Other' category. The return to the 2014 figure is evident. It is possible that offshore working does involve a relatively high degree of 'support' or off rope effort but these figures seem excessive, particularly as there is a similar relationship with onshore work hours. However, there was also a similar profile two years previously in 2014 with 'Other' also virtually double 'On Rope'. As usually expected, training figures were very low, totalling only 9,441, which, for a workforce of 1,896, equates to only 5 hours per employee. It may be assumed that North Sea Operators continue to 'import' the majority of pre-qualified rope access technicians and only a modest supplement for training is required.

Fig 29 • North Sea Operators Hours Worked by Location



3.4.9 Other

Membership rose from 41 in Q1 to 48 by Q4 in this RAC. This may have implications as employment rose during the year, quarter by quarter, but working hours fell. However, membership by Q4 in 2015 had reached 53, indicating significant reductions in membership must have occurred in the interim; some 'losses' to the newly formed RACs would explain the apparent loss of members. The diversity of member companies that fall within this RAC has been noted previously and there is little common ground between members other than that of rope access working.

Fig 30 • Other Employment by Grade

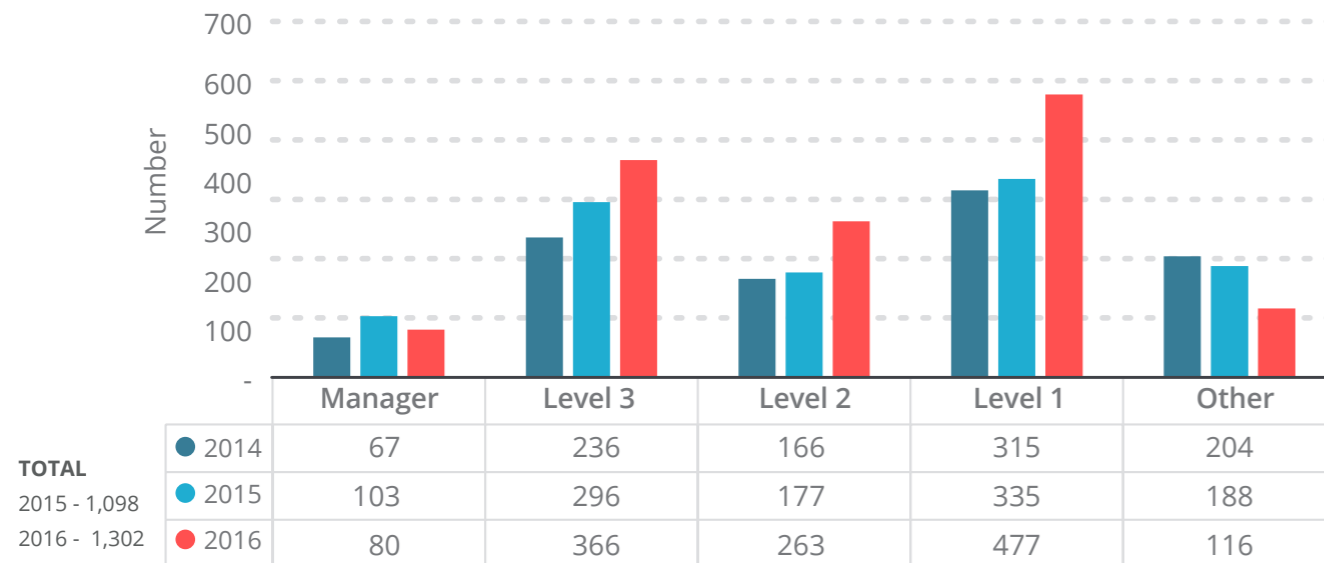
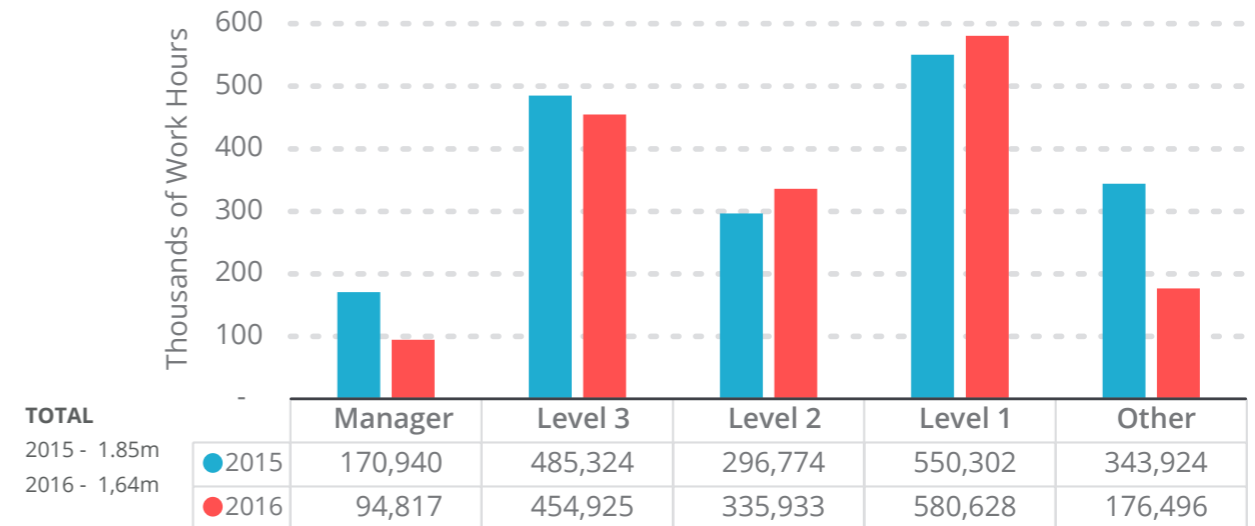


Fig 30 shows that, despite a membership reduction, an 18% increase in average employment occurred, from 1,098 to 1,302 in 2016; the increase was due to increases in all qualified technician grades, particularly L1. The significant fall in 'Other' grade employees is also apparent. Quarter by quarter figures show a steady increase for all grades as the year progressed, rising from 1,034 to 1,498 in Q4.

This results in a small reduction of utilisation from 1,081 hours per employee per annum to 1,036. The increase in work hours is largely due to increases for L1 and L2 technicians but the utilisation for both grades still fall below 1,000 hours per employee per annum.

The increase in work hours and employment coincides with increases in onshore working (Fig 26), notably 'On Rope' and, therefore, presumably undertaken by L1 and L2 technicians. The continuing increase in onshore working is clearly evident.

Fig 31 • Other Hours Worked by Grade

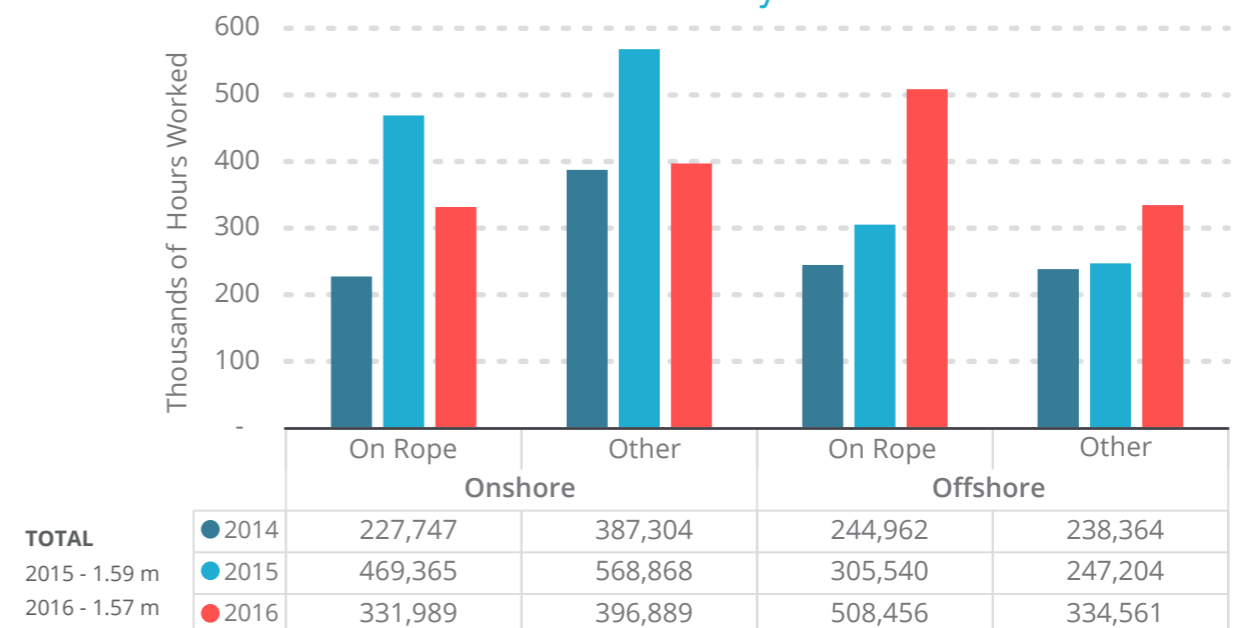


Training hours totalled 29,305, averaging approximately 40 hours per employee for the year, more than the average of 31. Given the increases in all technician grades, and noting that promotions from L1 to L2 and L2 to L3 are required to enhance these grades, it is remarkable that the number of L1s rose so significantly, from 369 to 543 by Q4 despite probable losses due to promotions to L2.

Associated work hours do not show the same pro rata increases. Fig 31 shows that total work hours fell to 1,642,799 from a previous total of 1,847,264. This is reflected in a decrease in utilisation from 1,682 to 1,262 hours per employee. However, these are average values and do not reveal changes during the year. For example, hours for L1s rose from approximately 109,000 to 160,000 from Q1 to Q4 but number employed also rose, from 315 to 477. These figures would result in little change in utilisation, from 1,384 to 1,342 hours per L1 per annum, above the average for the RAC.

Training hours totalled 70,904, giving an average of approximately 54 hours per employee for the year, well above the average of 31. But this would be in line with the significant increases in all qualified technician grades shown in Fig 30.

Fig 32 • Other Hours Worked by Location





3.4.10 Scandinavia

This newly created RAC has no previous data for comparison purposes. It comprised 11 members in Q4 with no particularly dominating members. Employment totalled 194 with qualified technicians accounting for 161 (Fig 33). Work hours (Fig 34) closely mirror the employment levels, slightly higher for L1 and L3 grades.

Fig 33 • Scandinavia
Employment by Grade

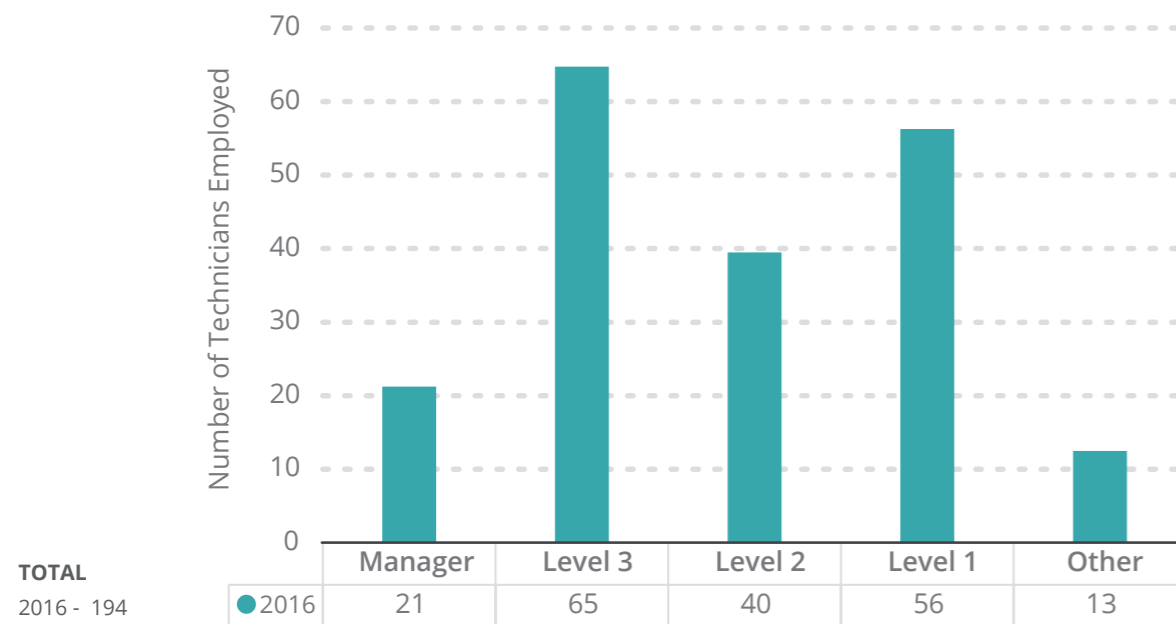
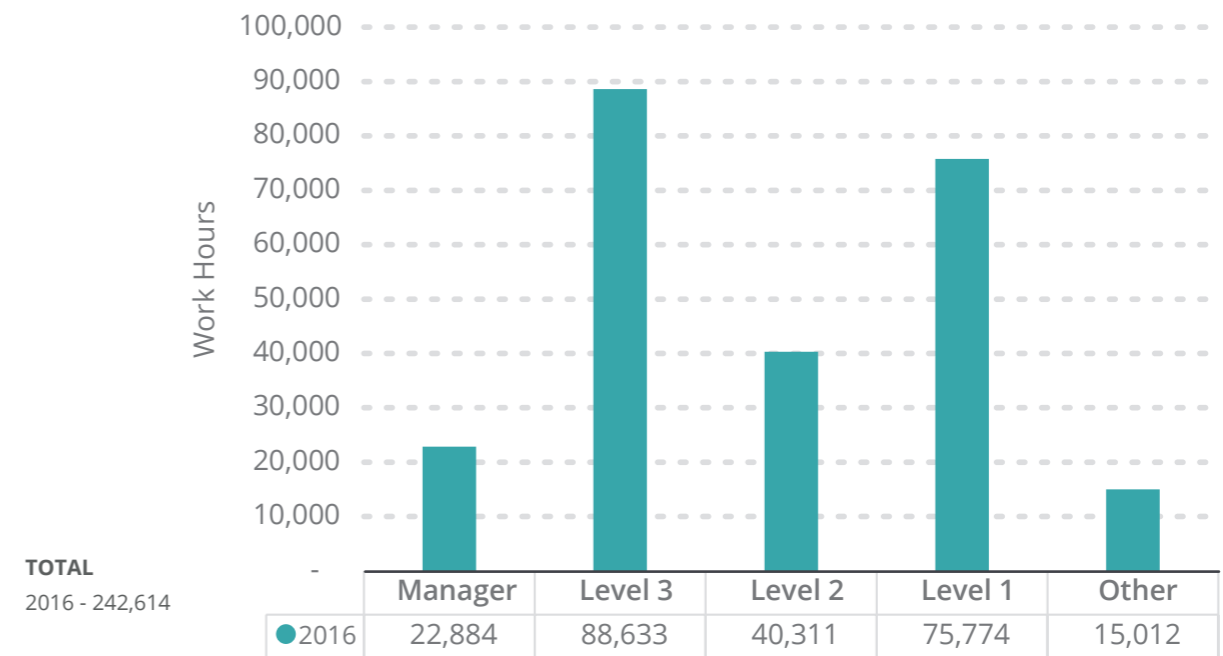


Fig 34 • Scandinavia
Hours Worked by Grade

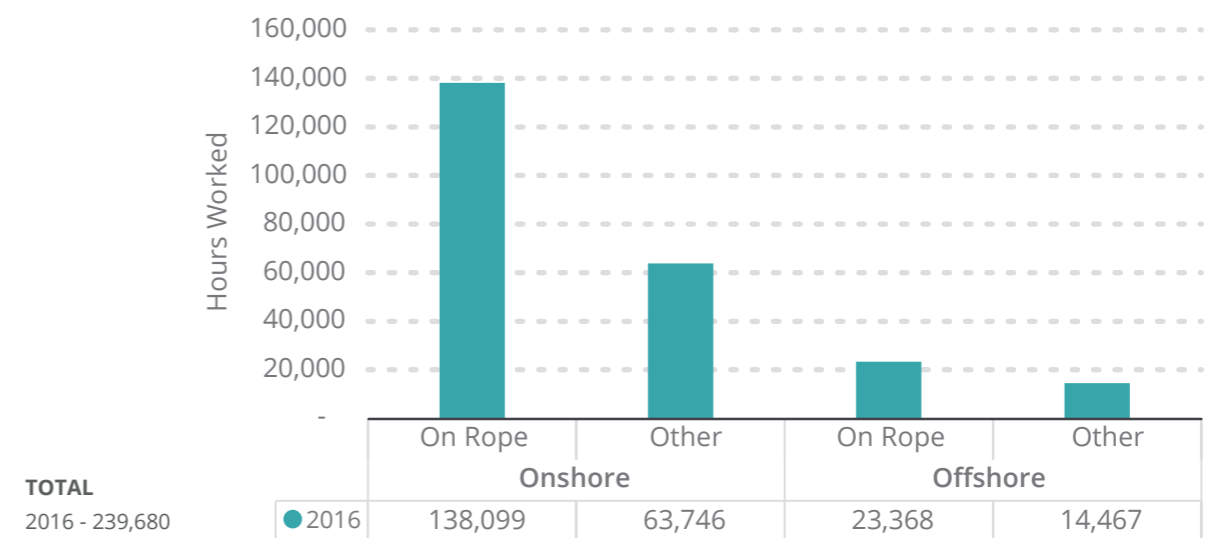


Utilisation averaged 1,251 hours per employee, somewhat higher at 1,353 for L1.

The distribution of the work hours by location (Fig 35) shows a clear dominance of 'On Rope' working in onshore work, backed up by 'Other'.

Offshore work accounted for approximately 16% of the total. Training totalled 2,934 hours, representing only 15 hours per employee, approximately half the average figure of 31 hours per employee.

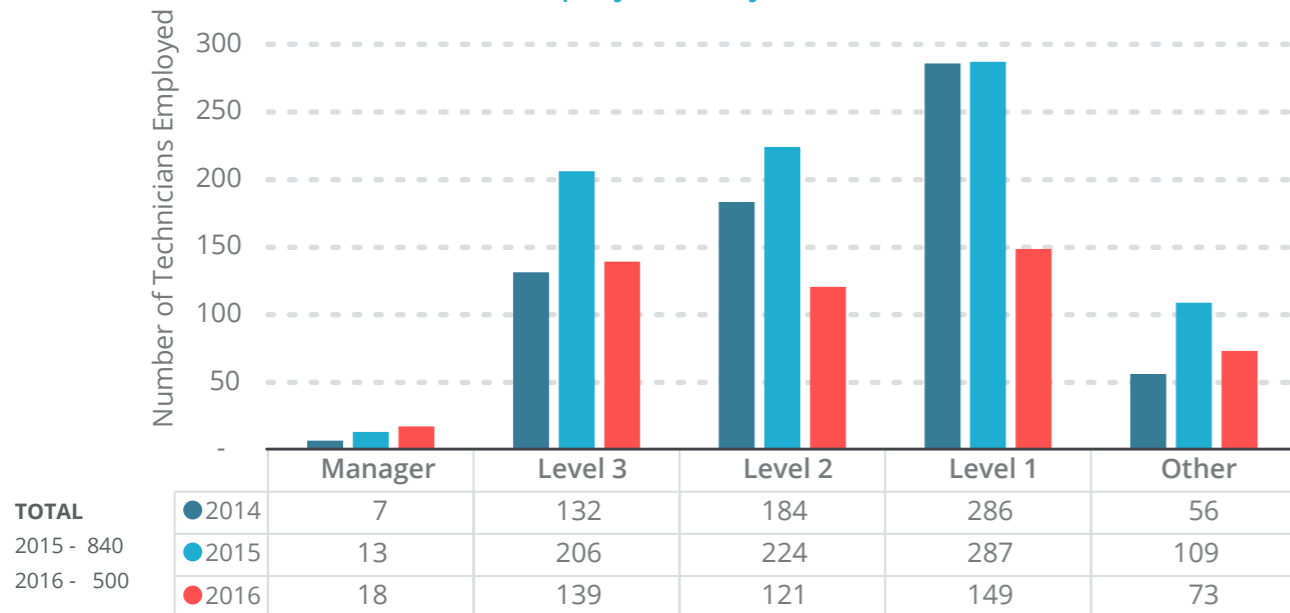
Fig 35 • Scandinavia
Hours Worked by Location



3.4.11 South Africa

Membership fell from 13 in 2015 to 10 in Q4 2016 with one member predominating and 3 others contributing substantially. It is the rapid decline in submission numbers of both employment and associated work hours, quarter by quarter in 2016, of the dominating member that will be seen to influence the charts that follow. The fall in average employment from 2014 and 2015 is clearly apparent in Fig 36 for the L2-3 technician grades with total employment falling from 840 to 500 in 2016. The averages shown disguise the rapidly falling trends during the year. This is even more apparent for the work hours shown in Fig 37.

Fig 36 • South Africa Employment by Grade



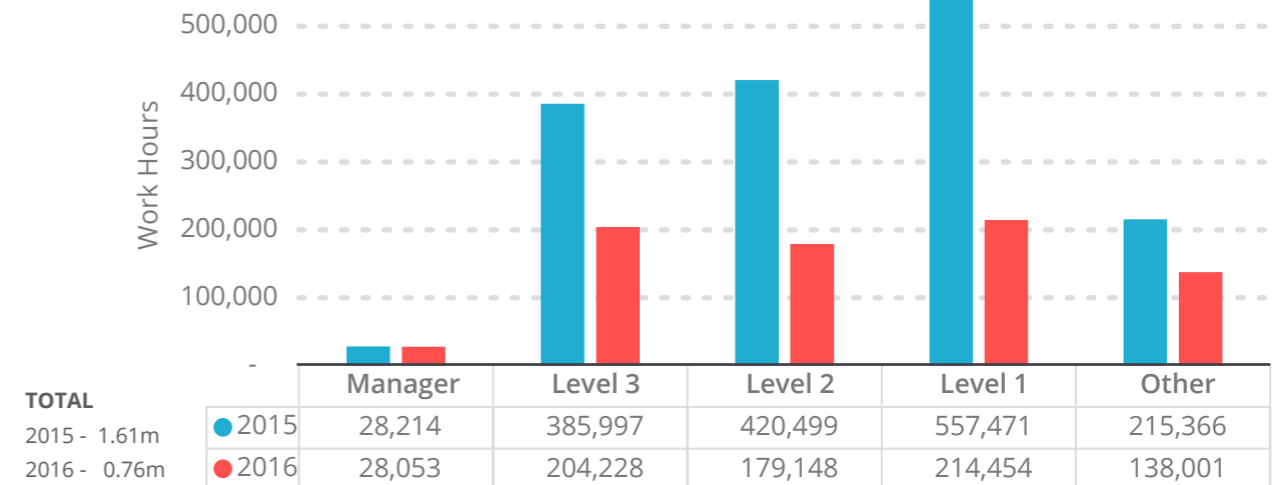
These trends, quarter by quarter, for both employed and associated work hours in fig 37, may be demonstrated by the figures below (in rounded hours):

- L3 employed 185 Q1 falling to 83 in Q4; work hours – 88,000 falling to 20,000
- L2 employed 199 Q1 falling to 63 in Q4; work hours - 98,000 falling to 15,000
- L1 employed 200 Q1 falling to 113 in Q4; work hours - 97,000 falling to 35,000

Total work hours fell by 53% to 763,884 but, as explained above, this is the average for the year which fell, quarter by quarter, from 331,000 to 100,000 (rounded hours). Further, the falls were largely due to figures submitted by a single member and may not necessarily reflect the RAC as a whole.

Overall, work hours by location naturally exhibited the same reductions. Offshore working remained the major area of employment but greatly reduced working. As with the employment and work hours in Fig 36 and Fig 37. Fig 38 does not reveal the quarterly trends.

Fig 37 • South Africa Hours Worked by Grade

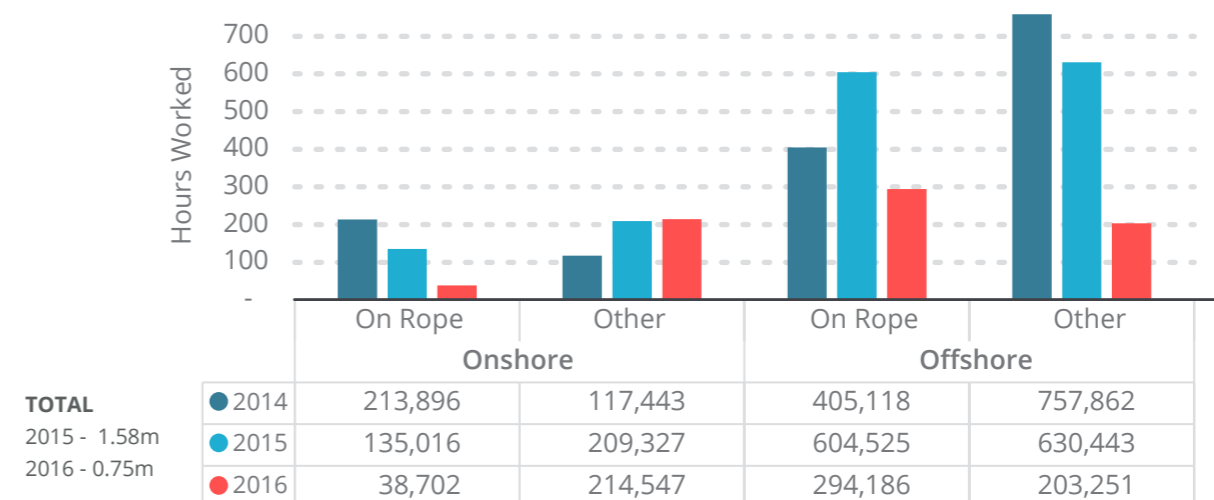


Onshore work hours changed little during the year but there were major falls in offshore working. 'On Rope' offshore working had the highest reduction, falling from ~144,000 in Q1 to only ~ 29,000 hours in Q4. Similarly, offshore 'Other' working fell from ~100,000 to ~17,000 hours. Thus, the loss in working hours for the major contributor was due to a downturn in offshore work.

Not surprisingly, utilisation fell from 1,914 in 2015 to 1,528 hours per person per annum in 2016, still a reasonable overall level. However, utilisation by quarter shows a rapid decline from 1,940 in Q1 to only 1,196 by Q4, demonstrating the extent of the decline over the year.

Training hours totalled 13,198 and, unlike other figures, remained reasonably consistent through the year. This represents approximately 26 hours per employee, nearly in line with the average. Thus, despite the losses in employed and work, training remained an important component for this RAC. The loss of well over 400 technician grades L1 to L3, from 683 in Q1 to 259 by Q4, must be of concern. It represents a large loss of the investment in experience and training, apart from human considerations if no other employment was available.

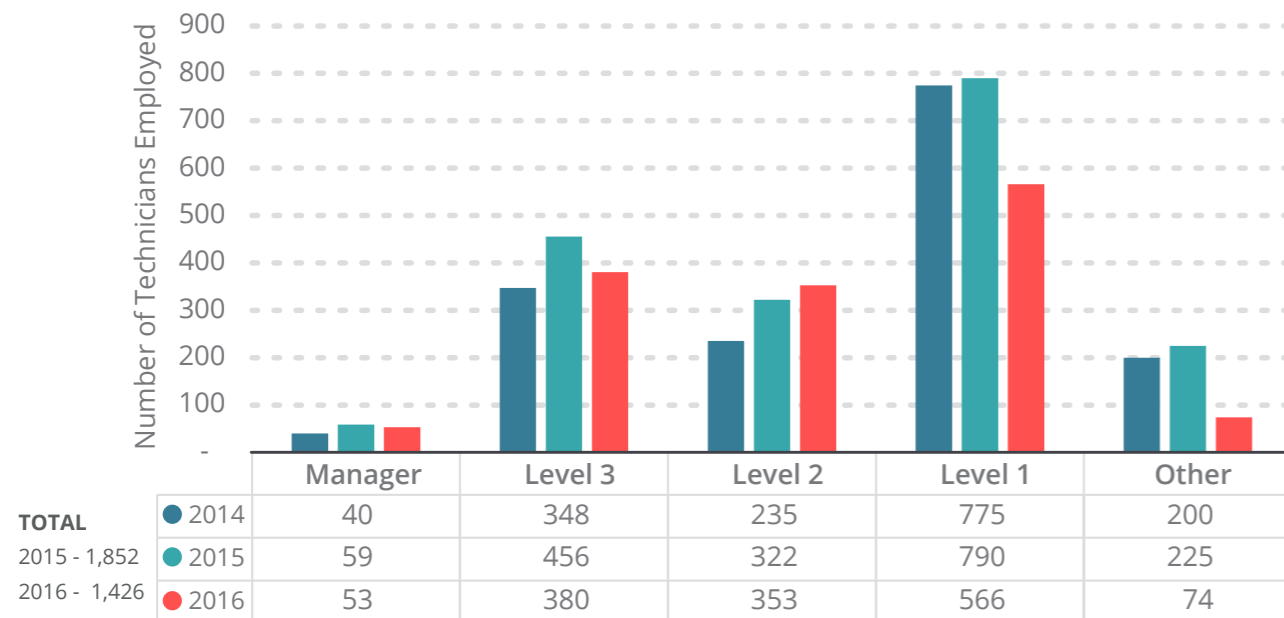
Fig 38 • South Africa Hours Worked by Location



3.4.12 South East & Far East Asia

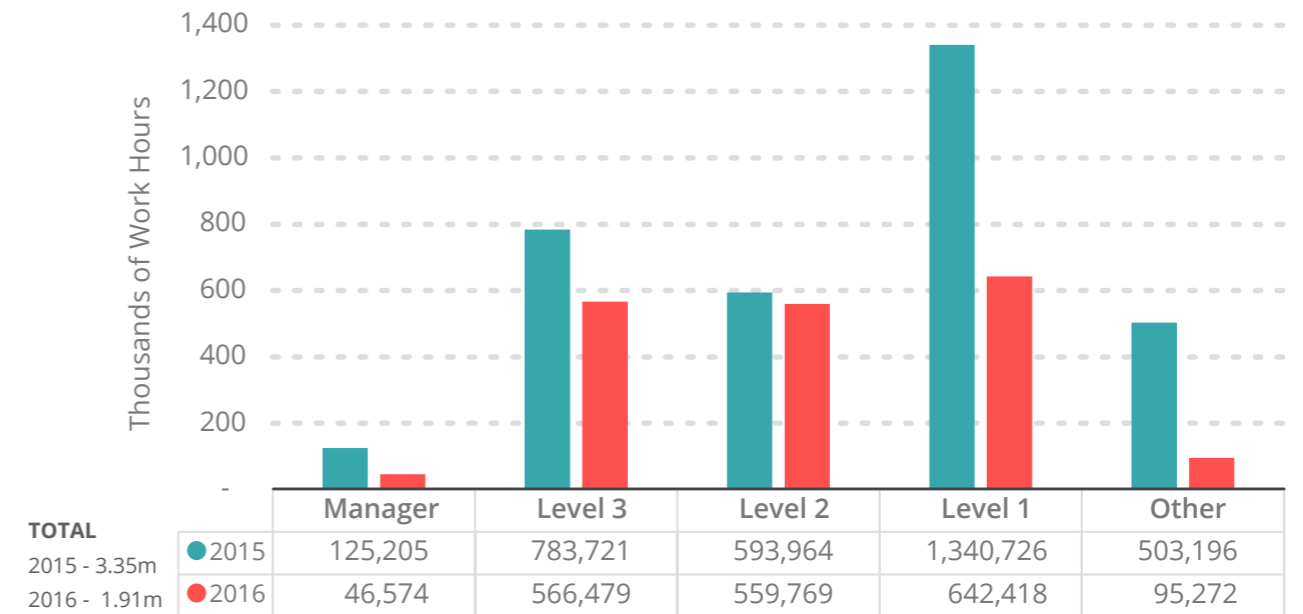
Membership increased substantially during the course of the year reaching 44 from a start of 40 with 5 major contributors. Despite the increase in membership, average employment in Fig 39 fell from 1,852 in 2015 by nearly a quarter to 1,426, even below the 1,598 reported in 2014. The decrease mainly occurred in L1 and 'Other' grades, the latter probably a result of improved assessment of supporting effort by members. Some of the L1 loss may be a result of promotions to L2 which increased, but only marginally.

Fig 39 • South East & Far East Asia
Employment by Grade



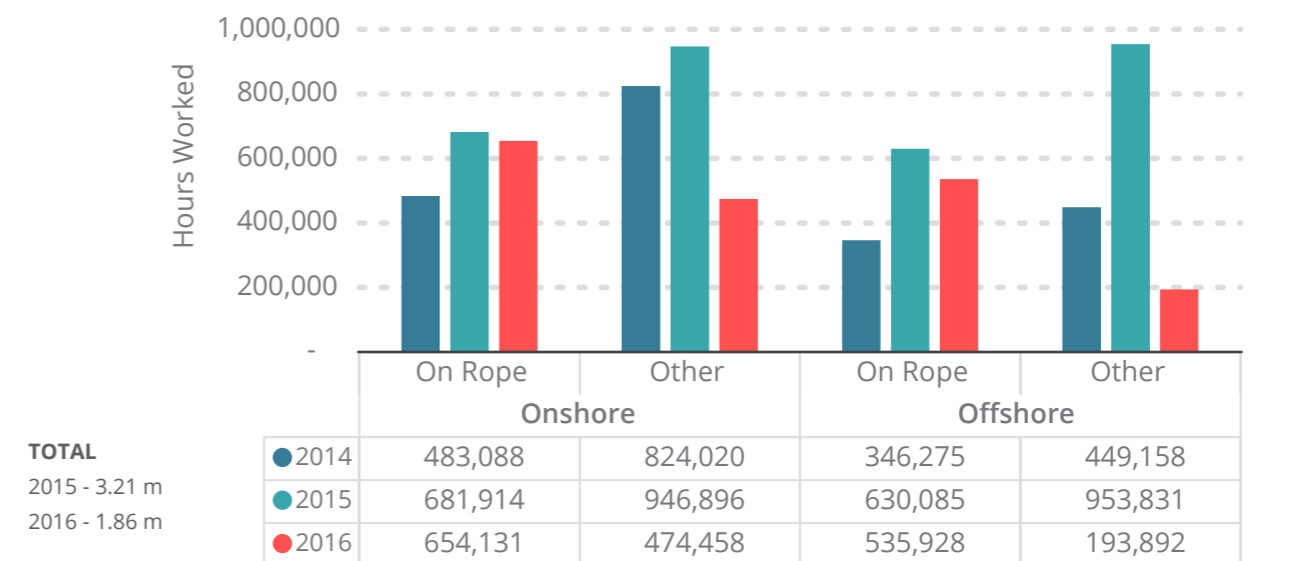
The work hours of 1,910,512, corresponding to the employment grades, are shown in Fig 40 and give an average utilisation of 1,357. As with employment, they are well below the 2015 figures that totalled 3,346,812, a decrease of 43%. The decrease was largely due to major falls in L1 and 'Other' work hours, the reductions being well above levels that would be expected from reductions in the employment figures. This is confirmed by the reduction in utilisations, down to only 1,135 in the case of L1s.

Fig 40 • South East & Far East Asia
Hours Worked by Grade



Onshore work, totalling 1,128,589, exceeded offshore working of 729,820 hours by a substantial margin. 'On Rope' working, for both onshore and offshore, exceeded support or 'Other' working where the major reductions in work hours occurred. The relatively minor reduction in 'On Rope' working, from 1,311,999 to 1,190,059 hours, implies that the fundamental business of rope access had only marginally reduced in 2016. Training hours submitted totalled 52,103, giving approximately 37 hours per employee, slightly above average.

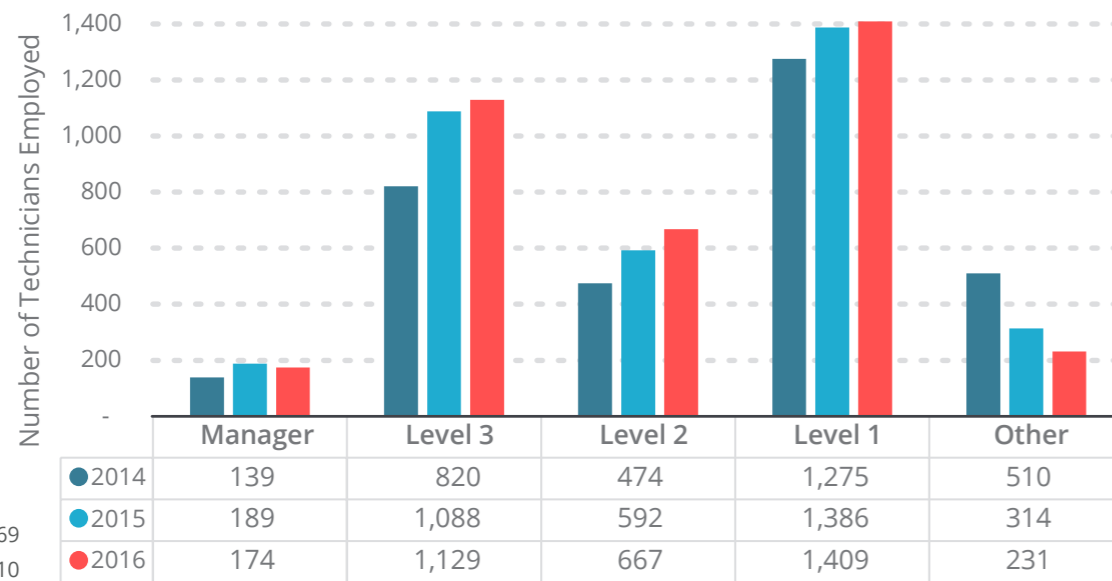
Fig 41 • South East & Far East Asia
Hours Worked by Location



3.4.13 United Kingdom

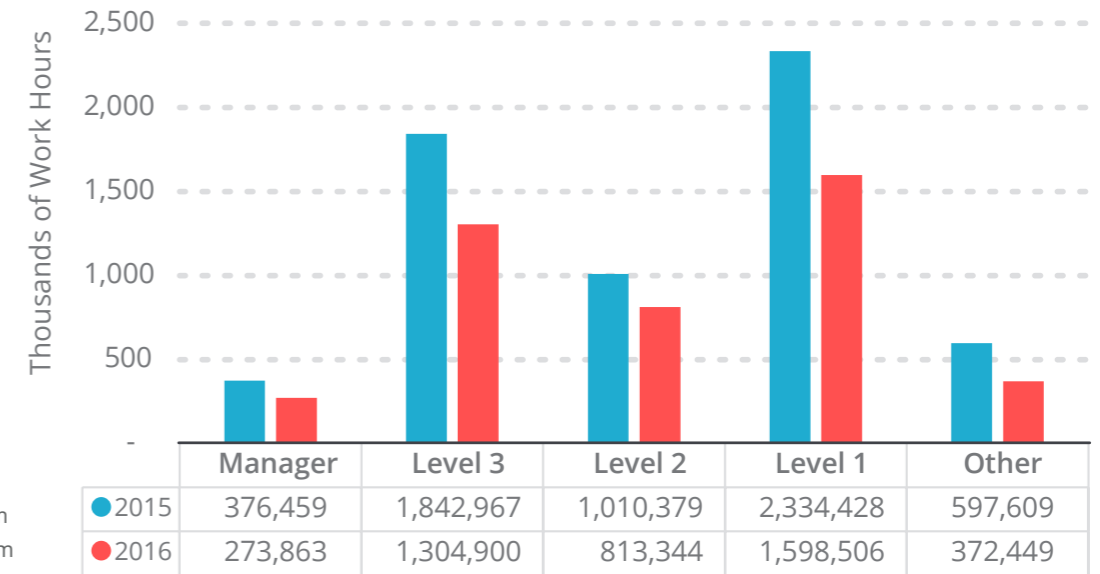
Membership, after some changes, settled to 100 by Q4, returning to the same number as Q4 in 2015, and with 10 major contributors. Total employment rose marginally overall from 3,569 to 3,611 (Fig 42) with minor gains for all qualified technicians, but balanced by a significant fall in 'Other' employees. The small increases in L2 and L3 numbers probably reflect promotions from lower grades with L1 numbers remaining virtually constant by limited recruitment.

Fig 42 • United Kingdom Employment by Grade



The minor increase in employment was not accompanied by an increase in work hours, as Fig 43 clearly shows. A 29% reduction in overall hours was not related to any quarterly trend that remained reasonably consistent during the year. The fall in work hours, from 6,161,841 to only 4,363,062 in 2016, occurred across all grades with the greatest numerical losses with L1 (~730,000 reduced hours) and L3 (~540,000 reduced hours).

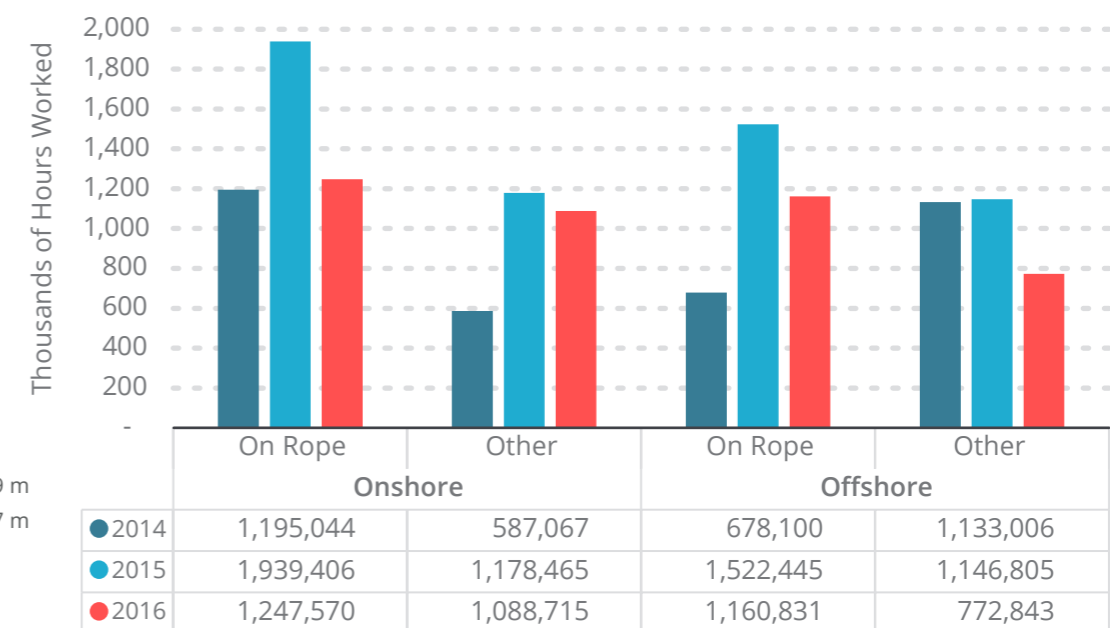
Fig 43 • United Kingdom Hours Worked by Grade



Associated utilisation overall was 1,208, unsurprisingly well below the 1,716 hours per employee enjoyed in 2015. L1 utilisation, in isolation, had fallen to only 1,134 hours per employee. Fig 44 shows that the loss in work hours occurred mainly in 'On Rope' and primarily onshore but with substantial loss also offshore. Total onshore work reached 2.34 million hours, marginally greater than the 1.93 million work hours for offshore with declines in both 'On Rope' and 'Other' working. On a more positive note, offshore 'On Rope' working nearly doubled the 2014 figure.

Training hours totalled 93,104 giving approximately 26 hours per employee overall and close to the average of 31.

Fig 44 • United Kingdom Hours Worked by Location





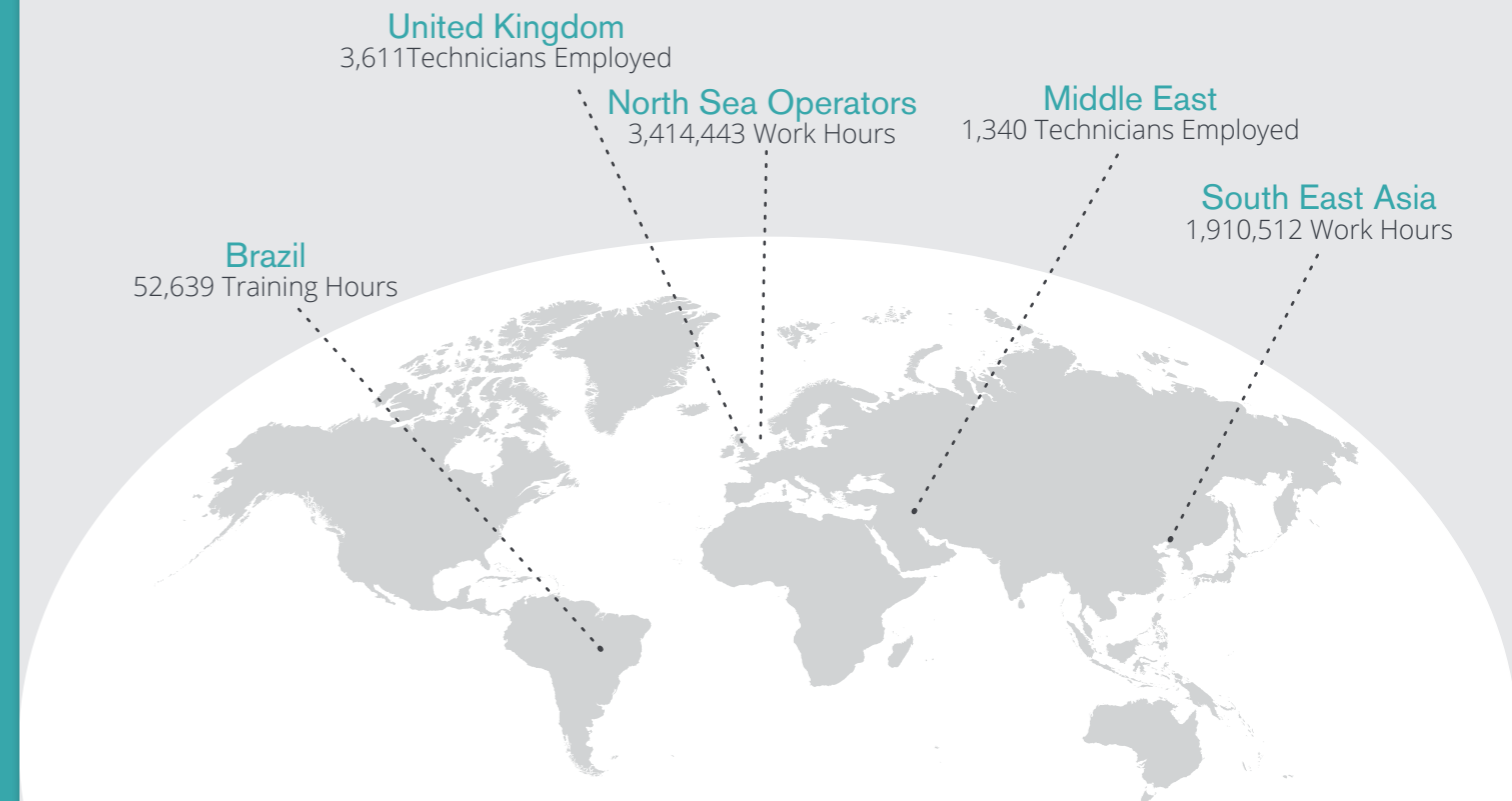
3.4.14 Summary of RAC data

The table below summarises the employment and work hours along with training data for each RAC. In addition, a further table compares 2015 and 2016 summary data of employment and hours that indicate areas of gains and losses for RACs.

Points to note include the large range in utilisations and also training hours per employee. It is suspected that, where higher hours are recorded for the latter, this may be largely due to submission data still incorporating trainer hours.

Table 1
Summary of RAC Data

Regional Advisory Committee	Members (at year end)	Employed (average of 4Q's)	Work Hours	Utilisation (per employee)	Hours being trained	Av. training hours (per employee)
Australia	29	1,108	1,373,625	1,240	35,420	32
Benelux	17	335	307,779	919	7,697	23
Brazil	21	566	561,977	993	52,639	93
D-A-CH	5	44	42,694	970	2,479	56
Mediterranean	9	55	48,686	885	6,509	118
Middle East	22	1,340	2,668,281	1,991	34,794	26
North America	19	725	751,101	1,036	29,305	40
N. Sea Operators	17	1,896	3,414,443	1,801	9,441	5
Other	48	1,302	1,642,799	1,262	70,904	54
Scandinavia	11	194	242,614	1,251	2,934	15
South Africa	10	500	763,884	1,528	13,198	26
South East Asia	44	1,426	1,910,512	1,357	52,103	37
UK	100	3,611	4,363,062	1,208	93,104	26
TOTAL/ AVERAGES	353	13,100	18,091,456	AV. 1,381	410,527	AV. 31



In the comparative table next, the green colour represents increases and decreases are shown in red, in numbers from 2015 to 2016 for each RAC. In effect, the table reproduces Fig 4 supplemented by employment numbers alongside work hours.

Table 2
Comparison of RAC Data

Regional Advisory Committee	Technicians Employed 2015	Technicians Employed 2016	Number of Work Hours 2015	Number of Work Hours 2016
Australia	913	1,108	1,131,109	1,373,625
Benelux	411	335	543,907	307,779
Brazil	871	566	1,616,646	561,977
D-A-CH	61	44	89,308	42,694
Mediterranean	-	55	-	48,686
Middle East	1,449	1,340	2,883,359	2,668,281
North America	617	725	667,182	751,101
N. Sea Operators	1,543	1,896	3,098,461	3,414,443
Other	1,098	1,302	1,847,264	1,642,799
Scandinavia	-	194	-	242,614
South Africa	840	500	1,607,546	763,884
SE & FE Asia	1,852	1,426	3,346,812	1,910,512
UK	3,569	3,611	6,161,841	4,363,062
TOTALS	13,224	13,102	22,993,435	18,091,456

4

ACCIDENT & INCIDENT STATISTICS

4.1 Introduction & Nomenclature

For the purpose of this report, the following meanings apply to terms used in the sections that follow:

'Fatality' - Death within one year as a result of an accident or illness from work.

'Major Injury' - Injuries that meet criteria common to most European agencies and other countries and listed in IRATA reporting arrangements. Typically, 'Major' injuries would include, for example, broken major bones, any amputation, major dislocation, 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' (DO) - 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. Conversely, any injury, ill health or other medical issue should be reported under 'Less than 7 day Injury' irrespective of whether or not time off work resulted.



'Ill Health' - Medical conditions leading to interruption or suspension of work due to non-injurious cause e.g. psychological, stress, taken un-well (headache, stomach upset) or other non-trauma medical condition brought on by or made worse by work. If 'Serious' reported as 'Over 7 day', otherwise reported as 'Less than 7 day' injury.

'Sprains/Strains' - Muscular injuries that result in prevention or cessation of work. As above, if 'Serious' 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 injury' and 'Dangerous Occurrences' are excluded when comparisons are made with other international statistical data but Eurostat and BLS data requires consideration of some 'Less than 7 day' injuries.

Before addressing the accident and incident data, this report, in line with most others, considers outcome of accidents and incidents. However, it should be born in mind that any and every accident or incident will have potential lessons to be learnt, irrespective of outcome. Thus, even an apparently minor 'Dangerous Occurrence', if properly investigated, may reveal serious underlying problems, concerns or lessons to be learnt not only for the individual member but for the organisation and industry as a whole.

4.2 Consequence of Accidents & Incidents

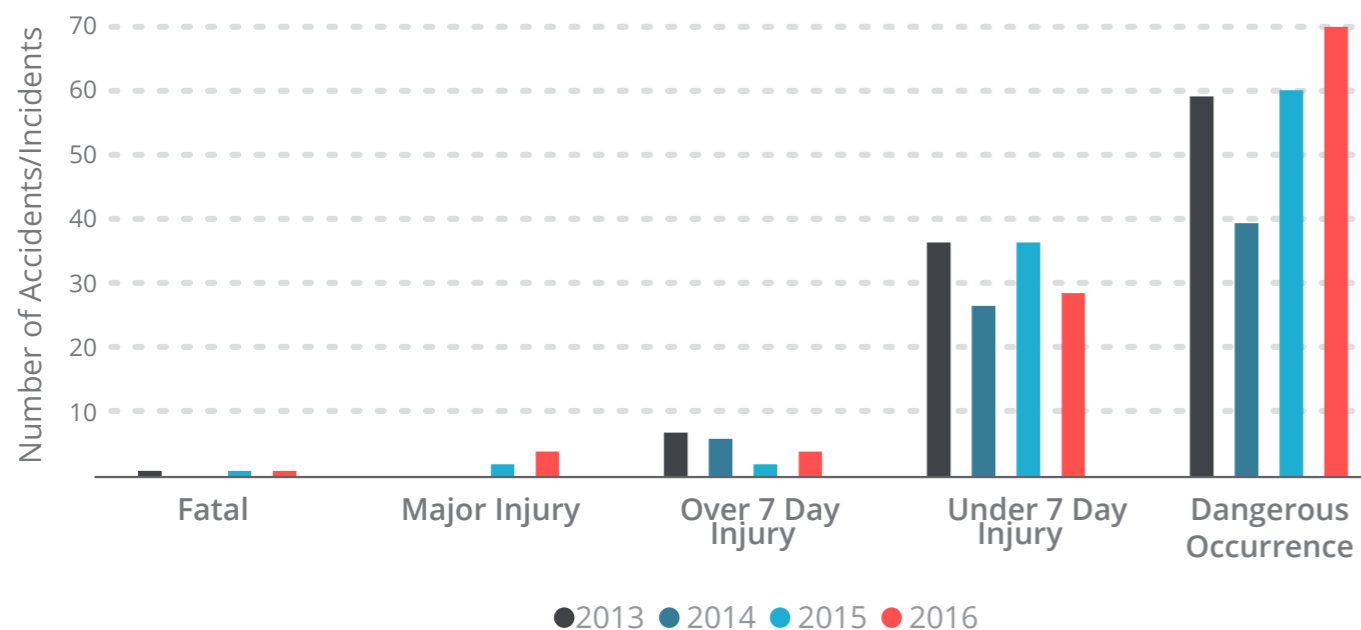
The consequence of all reported accidents and incidents is shown on the chart (Fig 45) together with those for the previous three years. What will be immediately apparent is that reporting numbers for all accidents and incidents (108) has changed little from previous years despite 'encouragement' to report all incidents, noting that Dangerous Occurrences and 'Less than 7 day Injuries' are not 'reportable' to some agencies. Additionally, there still appear to be problems submitting reports correctly and with adequate information. Where necessary, corrections and amendments were made prior to subsequent analysis.

Of the total of 108 acceptable reports received, the majority fell into the 'not reportable' category with 71 'Dangerous Occurrences' and 29 'Less than 7 day injuries'. As in 2015, reporting difficulties should no longer be an excuse for such low numbers, particularly of 'Dangerous Occurrences', that had risen somewhat, but still remained well below that expected for 18 million work hours.

To repeat - *'..reluctance to report incidents and accidents... reduces the value of the database and the statistical value of 'lessons learnt'; hinder attempts to identify possible trends in data;... casts doubt over the validity of the analysis ... undermines trust in the subsequent calculation of accident rates, ...'*

A total of 8 reportable accidents were recorded, very sadly, including a fatality.

Fig 45 • Consequence of Accidents and Incidents



“
Reluctance to report incidents and accidents reduces the value of the database and the statistical value of 'lessons learnt', hinders attempts to identify possible trends in data, casts doubt over the validity of the analysis and undermines trust in the subsequent calculation of accident rates.
 ”


108
Reports received


71
Dangerous Occurrences


7
Serious Injuries


29
Minor Injuries


1
Fatality

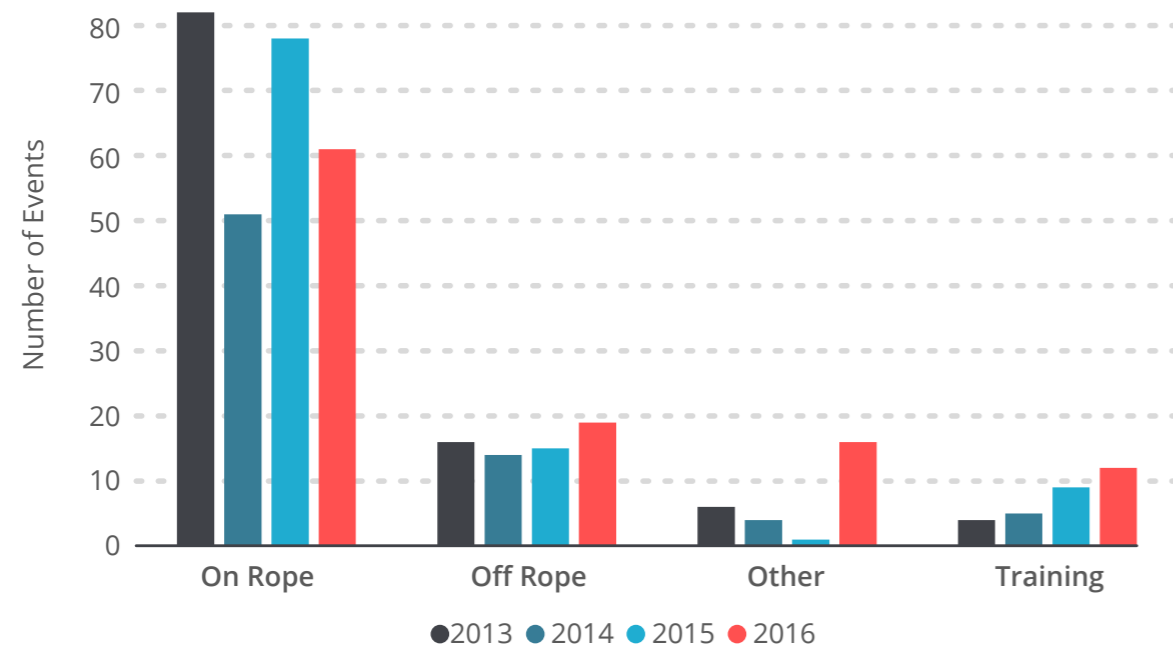
4.3 Location of Accidents & Incidents

It is no longer possible to compare directly the location of events for 2016 against previous years' data because of reporting changes, with the exception of 'On Rope' working which remains consistent. Therefore, the chart (Fig 46) is based on numerical values with no account of 'population' (work hours).

The distribution of all 108 reported accidents and incidents, according to location, alongside figures for previous years. Over half of reports (61) relate to 'On Rope' working. Most (46) were reports of 'Dangerous Occurrences' (dropped objects etc). However, the figures include the fatality (an apparent ill health issue unfortunately leading to death), two of the three 'Major' injuries (dislocated shoulder and arm/leg injury from a fall) and one 'Over 7 day' injury (combined hand/foot injury). There were 12 'On Rope' 'Less than 7 day' injuries that included six strains/sprains and four instances of being taken ill while on rope, including the fatality. Although the fatality appears to have taken place shortly after leaving ropes, for the purpose of this report, it is taken to have been initiated whilst on ropes and, therefore, treated as an 'On Rope' fatality.

To take into account differences in working hours for each location, numbers should be divided by the working hours for each location if a realistic 'time at risk' comparison is to be made. It was noted above that this was no longer possible.

Fig 46 • Location of All Events



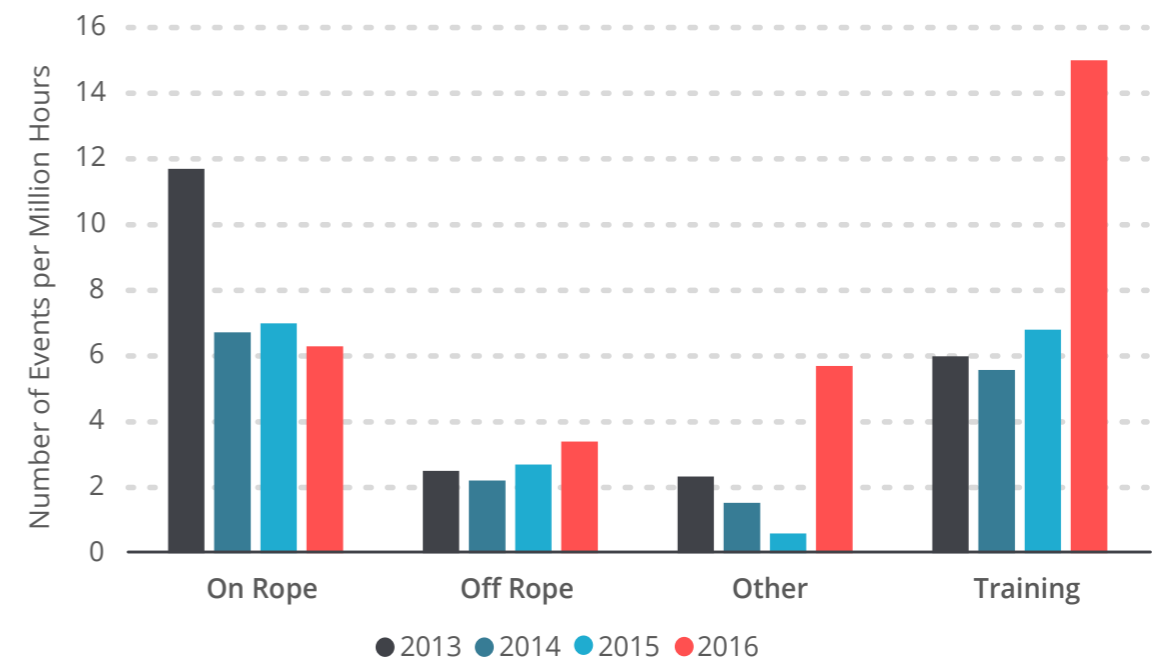
However, some indication may be provided by judiciously apportioning 2016 work hours, based on pro rata historical data. For example, training hours were increased (doubled) to account for 'loss' of trainer hours that are now incorporated within overall work hours. Thus, care is needed in interpretation because of the arguable assumptions used in construction of the chart (Fig 47).

Even doubling training hours cannot disguise the obvious dominance of training as the leading 'time at risk' component in the chart. This has been increasing over the last three years and, as stated in 2015 '... the data does indicate the inherent dangers in training and necessity for trainers to be aware of the concerns...' However, the relatively low number of training hours will result in a greater 'sensitivity' to individual events that totalled 12 in 2016 (9 in 2015).

Training did account for one of the 'Major' injuries (fractured arm) and one 'Over 7 day' head injury in a fall. Of five 'Less than 7 day' injuries, three included being taken ill. The remainder (5) were 'Dangerous Occurrences'. Given that, on average, training courses may be 40 hours and that total hours recorded for training was ~ 400,000 hours, this suggests that approximately 10,000 trainees were involved. This would imply an injury / illness rate of ~0.7 per thousand trainees (70 per 100,000). However, the 'reportable' injury rate would be, for the two injuries, ~0.2 per thousand (20 per 100,000).

Also notable was the increase in 'Other' location events but the majority, 14 of 17 reports, were 'Dangerous Occurrences', some unrelated directly to rope access (e.g. four were site vehicle related items). Three were 'Less than 7 day' injuries. Again, the relatively low number of work hours, in effect, exaggerates the chart.

Fig 47 • Location of Events (taking into account estimated work hours)



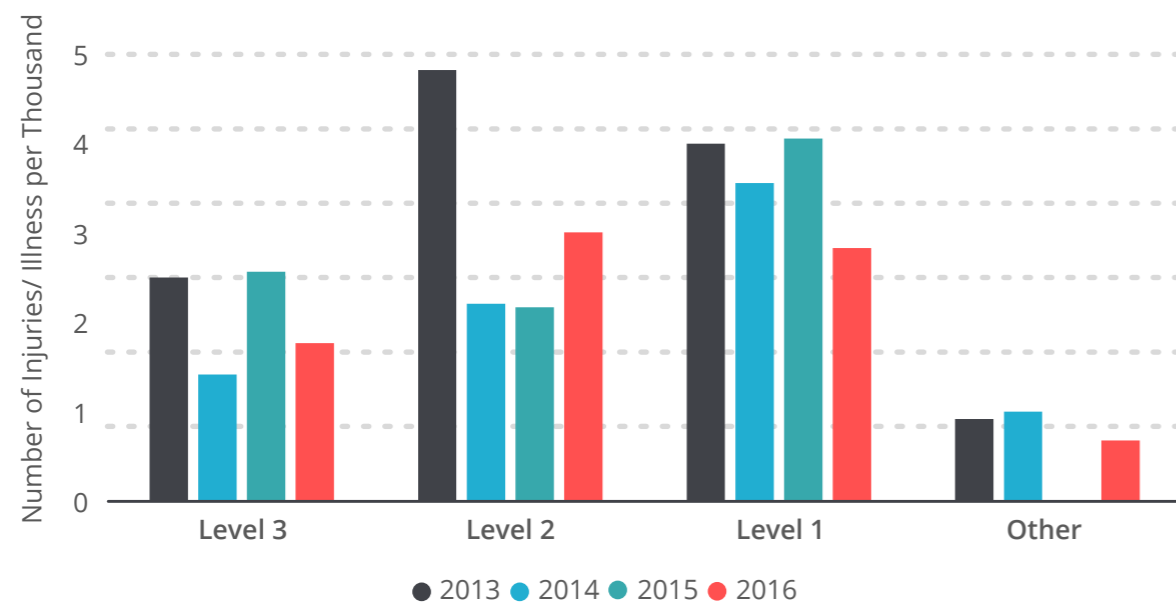
4.4 Accident Events by Grade

Fig 45 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 and charted alongside previous figures. Thus, differences in population for the different levels or grades and between annual variations are taken into account enabling comparisons to be made.

The immediate finding is that injury rates for all three grades remained much as in previous years with rates of approximately 2-4 per thousand. The single fatality occurred to a L3.

The numbers involved remain statistically small and relatively large changes or differences in the chart may be misleading due to the low populations.

Fig 48 • Injuries/ Illness by Grade



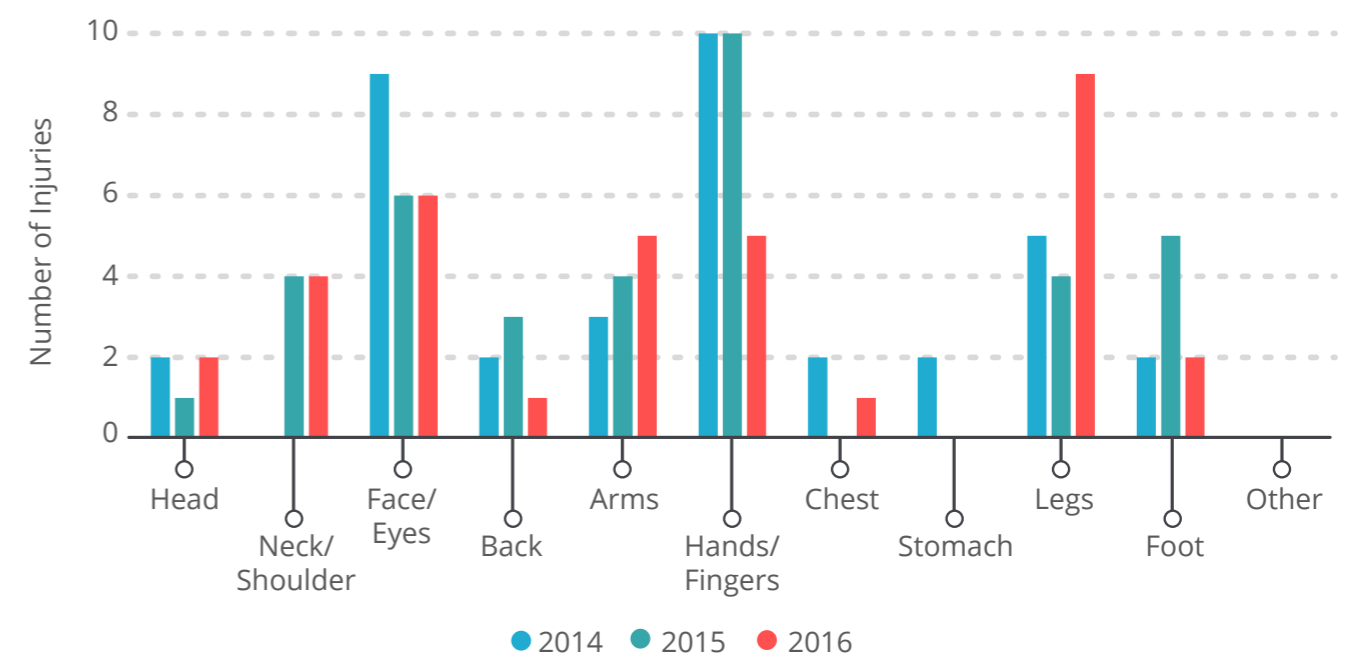
4.5 Injuries by Body Part

Leg injuries were followed by injuries to face and eyes, closely followed by hand/finger and arm injuries. Of the 9 leg injuries, one was a major injury (broken leg) and two were 'Over 7 day' injuries. Remaining leg injuries were due to various causes including a slip, strain, caught by an angle grinder and another striking a sharp edge.

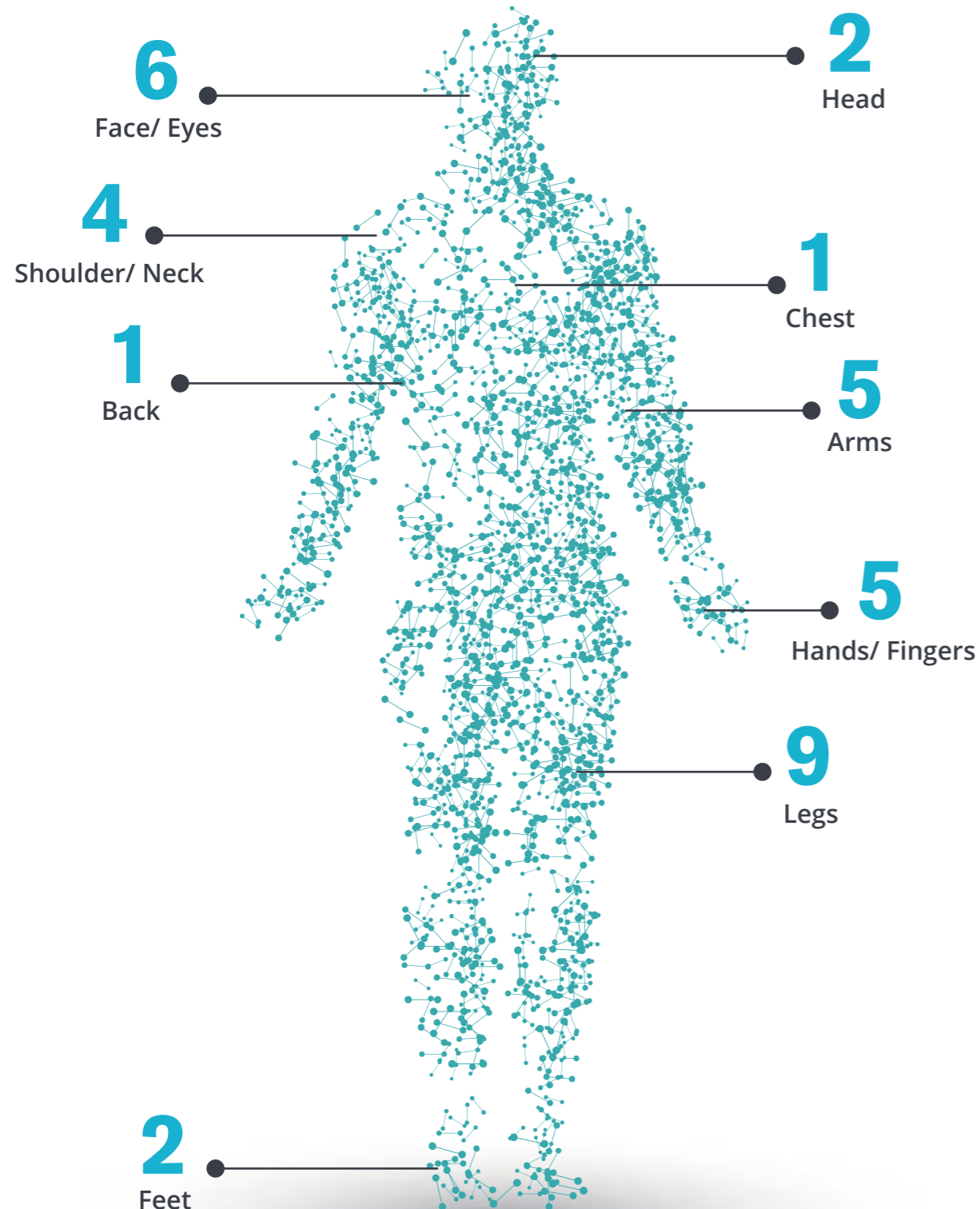
The reductions in hand/finger, back and foot injuries may be happily noted. Injuries to face and eyes, all 'Less than 7 day' injuries, included four instances of being struck by falling or moving objects. Two injuries resulted in loss of teeth, one from an item of rope hardware during training.

The two head injuries were caused by striking an object when standing up and a second from a flying tool component ('Over 7 day' injury). The fatality reportedly was not due to an injury but a medical condition.

Fig 49 • Injuries by Body Part



Number of Injuries by Body Part



4.6 Causes of Accidents & Incidents

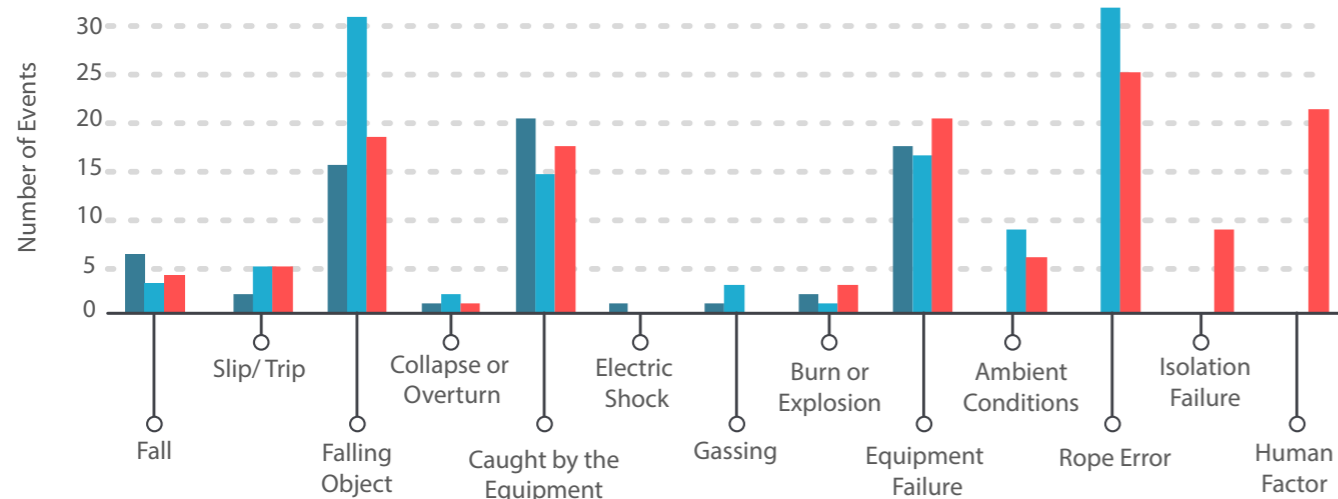
Allocation of a single specific cause for an accident or incident is rarely possible or even accurate. Only the category that most closely describes the immediate cause of an accident or a 'Dangerous Occurrence' is usually submitted in reports and even these may be erroneous for various reasons, such as simply ascribing it to an individual error. It is fully acknowledged that this is a serious weakness of this analysis as it relies on such submissions and does not identify true root causes which must, inevitably, include human factors (error, omission, training, competence, medical condition, etc.) and related issues (communication, understanding, awareness etc). Where possible or appropriate and necessary, more realistic root causes may be added; this was the case for approximately 10-20% of submissions.

In Fig.50, 'Human factor' is included; some events were justifiably covered by this category. Also, two additional factors, added for 2015 data, - 'Ambient conditions' and 'Rope error or omission' have been retained. This was to cater for a number of reports that fit these headings, thus ensuring they are examined. It should be noted that the chart is based on absolute numbers with no account of populations. As previously, 'Slip and trip' events (5) have been separated from 'Falls' (4) because the distinction is appropriate to this industrial sector. Finally, 'Electric shock' and 'Gassing' have been omitted, both with zero events.

A total of 137 'causes' have been identified with five numerically significant areas, namely falling or dropped objects (19), handling tools or equipment (18), failure or mal-operation of plant and equipment (24), rope errors or damage (25) and human factors (22). Lesser, but no less important, categories were falls (5), slips and trips (4), ambient conditions (6) and isolation failures or third party intrusions (8). The following examines each category in turn but not in any particular order.

Human Factors (22) and Ambient Conditions (6) Includes one fatality (medical condition/ exhaustion brought on during rope access in confined space/hot conditions), twelve 'Less than 7 day' injuries (nine due to illnesses, hydration balance and pre-existing medical conditions and nine 'Dangerous Occurrences'. The coincidence, particularly of hot/humid conditions and frequency of medical conditions brought on by such conditions should be highlighted. Three cases of dizziness/fainting and low blood pressure were reported.

Fig 50 • Cause of Accident/ Incident



'Self Inflicted' (8) Included a range of miscellaneous items from alcohol level, accidental drinking of paint thinners instead of water and use of undeclared pain killers. 'System' failures included working without permit and failure to swipe on at work, perhaps not strictly 'Dangerous Occurrences' but accepted as lapses at work.

Rope Errors (26) 'Dangerous Occurrences' accounted for 19 of the 26 events. All three 'Major' injuries were incurred 'On Rope'. The balancing four events were 'Less than 7 day' injuries. The various 'rope errors' may be summarised as follows with some in more than one category:

- Unattachment** 3 (one leading to fall and 'Major' injury)
- Unrestrained descent** 3 (one leading to 'Over 7 day' injury and rope burns to hands)
- Poor rigging/rope technique** 7 (includes mal-operation of devices)
- Damaged rope/equipment** 9 (includes out of date equipment)
- Injured by rope or on rope** 5 (includes two major injuries)
- Rope devices failed to operate** 2

Trainers particularly may wish to note that two of the unrestrained descents occurred during rope transfers. Although there were five instances of cut, snapped or damaged ropes, none resulted in injury.



Equipment Failure or Mal-Operation (21) Equipment failure, mal-function or mal-operation occurred in 21 cases. One led to an 'Over 7 day injury' to the head following a fall during training. Two events resulted in 'Less than 7 day' injuries, one a head injury when struck by a flying tool component and the second when a tool slipped resulting in a knee injury. The remainder were all 'Dangerous Occurrences'

The list of items varied, from accidental PLB (personal location beacon) operation and a hose failure to a battery fire. In five cases, mal-operation of tools and equipment was clearly the primary cause (two leading to the minor injuries). However, of specific concern was that 9 reports identified defects and/or mechanical problems with rope access equipment. These varied from a power ascender damaging a rope, a defective harness and a failed (snapped) rope during lifting to several instances of defective rope hardware components, some of which were brand new or unused. In the latter case, it is presumed manufacturers/suppliers were informed and took responsible action.

Caught by Tools or Materials (18) Out of the total, 9 were 'Less than 7 day' injuries and a single 'Over 7 day' injury, the latter caused by an angle grinder. Seven of the events were a result of being cut, caught by tools and sharp edges or near misses when moving or using tools (e.g. cut finger on swaged wire sling, striking knee on a bolt, cut arm on sharp plate edge). Five of the injuries were caused by being struck by moving items including a metal tag on rope, a rope device and flying tool components.

Of the 8 'Dangerous Occurrences', three may be noted. A rope was cut when being retrieved as it passed through a 'double flap' in a furnace and, potentially more serious, two technicians were exiting onto a wind turbine nacelle when the 'isolation' allowed a small rotation of the blade hub. A third event involved ropes trapped between a lift counterweight and the lift guide as the lift was operated under supervision.

Falling Objects (19) Of all falling objects, only one resulted in injury. A refractory block fell and struck a technician whilst on rope, inflicting a 'Less than 7 day' injury from a small cut below the eye.

All the remaining 'falling objects' were dropped by technicians. The items dropped ranged from a pneumatic sander and a pneumatic grinder to karabiners, assorted small tools and blades, a 3-4 kg drill, an outrigger, 1 kg dumbbell, a light shade and an eddy current set. In several cases it was stated that lanyards and fixings, intended to prevent dropped objects, had not been adequate or effective.

Two points may be made. In a couple of cases it could be argued that inappropriate tools were being used, such as a Stanley knife to remove rust. Secondly, the adequacy of attachment devices, particularly during tool manipulation and rope transfers, not just in normal use, should be considered before removal to site (tool box check?).

Isolation Failure and 3rd Parties (9) Although there were no actual injuries sustained due to the various instances of failed site isolation and barrier arrangements, there were several that could have resulted in serious injury or even multiple fatalities. Some of the more serious are highlighted below.

Two technicians were exiting onto a wind turbine nacelle when it moved. The isolation had failed to prevent the nacelle movement. Fortunately, they remained attached and were able to make themselves safe.

A third party office worker, despite barriers and notices, operated an elevator under maintenance by a rope access technician. The isolation in place did not prevent the lift being operated from the floor at which the lift was located. Fortunately, the technician was not on ropes at the time but was bruised by the lift.

A junction box 'blew' when a rope access technician reached it to carry out work. It had not been properly isolated prior to his arrival.

Of remaining items, two were related to either poor barriers or trespass past barriers, two to failures to operate isolation procedures properly and two miscellaneous items (swinging load near miss and non compliant transport arrangement).

It should be a paramount requirement that rope access safety supervisors assure themselves that all necessary isolations and site protection measures are in place and are fully effective. If warranted, 'double' isolations should be applied e.g. remove key and apply electrical and/or mechanical lock isolation. It may be noted that isolations should not only protect the rope access workers but should also consider protection of third parties.



Falls (4) and Slips and Trips (5) Two of the four falls resulted in 'Over 7 day' injuries, one a head injury to a trainee and the other combined arm and leg injuries. The latter was caused when, transferring from ropes to a fixed ladder, the technician did not re-attach to fixed ropes. The ladder slipped and the fall to ground resulted.

Another fall was also a result of a transfer. This time the transfer was from fixed ropes to a pulley rope but the pulley rope was not anchored and the technician descended unrestrained. Fortunately, a fall to ground was prevented by two technicians grabbing the pulley rope. Rigging failure was a prime but not sole cause.

The second 'Dangerous Occurrence' was caused by a glove impeding a descender from operating but the back-up operated and halted the descent.

Slips/trips resulted in four 'Less than 7 day' injuries, all trips or lost footing and striking a variety of fixed objects. One 'slip' on muddy ground did lead to an 'Over 7 day' knee injury.

Of the remaining items, it may be noted that the three 'burns' were all related to welding. One hand injury, when a gloved hand suffered burns during welding overhead, resulted in a 'Less than 7 day' injury. One 'Dangerous Occurrence' was caused by ignition of absorption pads and a second by a damaged welding power cable.

There were no reported injuries to third parties as a result of rope access working. The continuing low level of incident reporting or 'Dangerous Occurrence' reporting, in proportion to the employment and work hours, continues to be disappointing.



4.7 Time Lost

Of the 36 reported injuries, excluding the fatality, only 18 required any time off work. Reported days off work totalled only approximately 87.5 days or $87.5/13,100 = \sim 0.0067$ days per person, significantly less than in previous years. This is approximately half the EU 28 figure for 2014 (latest available) of ~ 0.011 which was approximately ~ 2.4 million days per 219 million working population or 0.014 days per person.

The IRATA data is clearly below reality as some accidents had no associated report of days lost. If days lost by others is added (69), the overall days lost reaches 156.5 giving 0.012 days lost per worker, very close to Eurostat data. Equivalent figures for UK (HSE Labour Force data 2015/16) were 1.19 days lost per worker for all illness and injury events. For the 37 injury/illness events and 87.5 days lost this gives 2.4 days per worker – roughly twice the UK figure.

http://ec.europa.eu/eurostat/web/products-datasets/-/hsw_mi02
<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>
<http://www.hse.gov.uk/statistics/lfs/index.htm> - see table LFSWDL

US private industry median figure for 2015 was 8 days but varies across industries without days off work criteria and, perhaps, equates to the overall IRATA figure of 18 days per reportable and non-reportable events involving time off work. 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> - see Table 1
<https://www.bls.gov/news.release/osh2.t04.htm>

The total of 156.5 days over 18 million work hours or 2.2 million work days, gives days lost due to injuries and illness 1.4 days in every 10,000 work days; this excludes consideration of the fatality.



4.8 Other Factors

Weather or Working Conditions

It is surmised that seven reports were associated with weather or working conditions as a factor in accidents and incidents though not all reports specifically identified working conditions were contributory factors. One 'Dangerous Occurrence' involved wind tangling ropes and a second was due to wind/wave conditions causing a lifted container to swing and causing a near miss as a worker ducked to avoid the container.

Four 'Less than 7 day' illnesses were all related to hot and/or humid conditions with workers feeling faint or dizzy. The single fatality appears to have been related to hot and humid conditions in confined space working and resultant medical conditions but there was no further information available at the time of reporting. It would appear that working in hot/humid conditions continues to cause significant problems despite various preventative measures employed.

Rescue

Rescue or direct assistance was required in only 4 cases, one of which occurred during training.

4.9 Summary

The total number of accident and incident reports submitted for 2016 was only 108. It may be assumed that all reportable accidents have been submitted but the relatively low level of associated reporting of 'Dangerous Occurrences' continues to be of concern.

Sorrowfully, there was one fatality in the year. The number of individuals suffering injuries totalled 37 but, in addition to the fatality, there were only 7 other reportable injuries, 3 'Major' and four 'Over 7 Day' or 'Serious' injuries. Of the 29 non reportable injuries, 18 were due to sprains or strains or various ill health issues.

A total workforce of 13,100 gives the injury rate of 53.4 injuries per 100,000 for all reportable injuries and a fatality rate of 4.7 per 100,000 workers on a five year accumulated average. Note that these figures are well below the figures that will be generated for comparative purposes later.

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. The workforce for 2016 was 13,100. However, to maintain a pessimistic analysis, and to avoid any possibility of criticism, a workforce corresponding to the hours worked will be used i.e. time at risk as this will be less. This is 18 million hours / 2,000 hrs per person per annum = 9,000, considerably less than the reported workforce and leading to an increase in the accident rates to be calculated.

The 'multiplication factor' per accident becomes $100,000 / \text{Number of Employees} = 100,000 / 9,000 = 11.1$ per accident. This figure is, in effect, the multiplication of any single event to reach the equivalent for a workforce of 100,000. Using the above, figures for the accident rates in 2016 become:

- **Fatality** $1 \times 11.1 = 11.1$
- **Major injuries** $3 \times 11.1 = 33.3$
- **Over 7 Day Injuries** $4 \times 11.1 = 44.4$

Thus, the total for combined reportable fatalities, injuries and illnesses was 89 per 100,000 and 78 per 100,000 for illnesses and injuries. (Notice that this is significantly higher than the figure of 53.4 per 100,000 that was based on the actual workforce of 13,100).

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.

The UK Health and Safety Executive (HSE) website key figures for 2015/16 provisional data for employees in selected industries are tabulated below together with equivalent IRATA figures. <http://www.hse.gov.uk/statistics/tables/index.htm> (e.g. See Table RIDHIST - 2015/16)

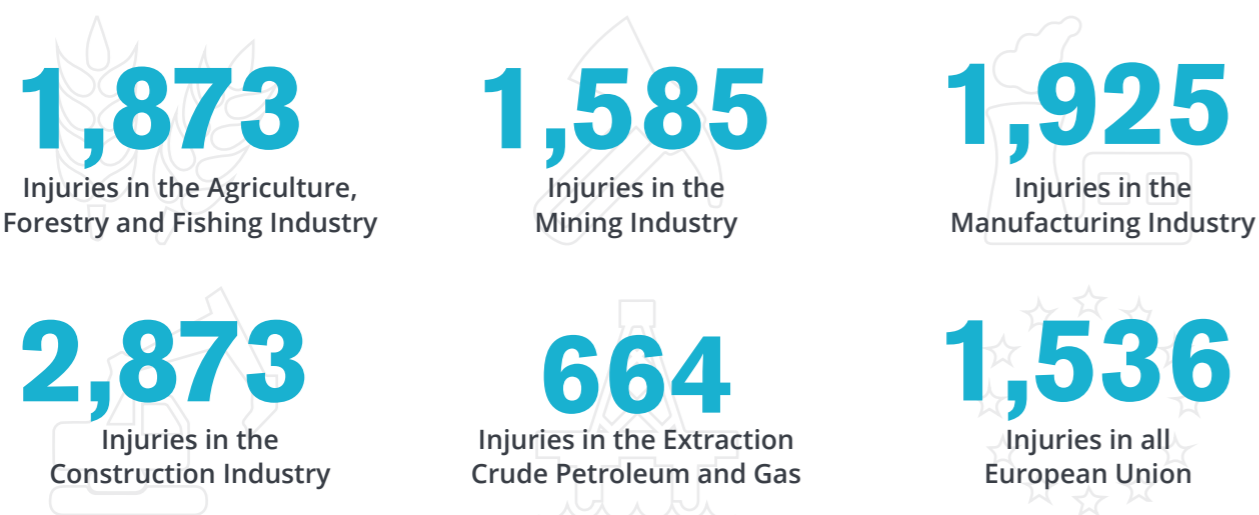
Table 3
Incidents by Industry

Industry	Fatalities	Major Injury (Equivalent to RIDDOR Specified Injuries)	Serious (Over 7 Day injuries)	Total (excludes fatalities)
Agriculture, Forestry & Fisheries	7.7	204	319	523
Mining and Quarrying	1.5	54	159	213
Manufacturing	0.9	103	360	463
Construction	1.9	139	259	398
Service Industries	0.1	103	360	463
All Industries	0.5	68	206	274
IRATA International	11.0	33	44	78

(All figures in rounded numbers of injuries per 100,000 employees)

Overall, the IRATA figures in the table remain well below all categories including those for 'Service Industries' with the exception of the fatality, the full impact of which is now revealed. HSE acknowledges that Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) data may be well under-reported by approximately 50% which would require the comparative data in the table to be doubled. The overall IRATA injury rate is ~ 35% of the UK All Industry rate except in the case of 'Major' injuries (~50%). However, the percentage falls further if the under-reporting to RIDDOR is taken into account.

Direct comparison against EU figures, discussed below, is limited for several reasons. Latest available EUROSTAT figures are for 2014. EU 27 figures were similar to those for EU 28. In order to compare data it is necessary to extract those accidents that more nearly approach the '4 days or more off work' criterion now used by Eurostat and add them to the 'Over 7 day Injuries'. The number of injuries that required three or more days off work was still only 8 giving a rate of $8 \times 11.1 = 89$ injuries per 100,000. This figure may now be compared to EU 28 figures:



Only **89** Injuries affected IRATA International Technicians

(All figures per 100,000 workers)

Even if the most pessimistic assumption is made, and all injuries are taken into account, irrespective of how trivial, the figure will be $37 \times 11.1 = 411$ – still only ~25%. From the figures above, the IRATA rate for all injuries remained approximately 6% of the 'All' EU-28 figure for 2014.

www.hse.gov.uk/statistics/european/tables.htm
<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>
<http://ec.europa.eu/eurostat/data/database>

Care is also needed in comparing IRATA data to USA 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 2015. Figures have been converted from 'per 10,000 workers' to 'per 100,000'. US data is based on full-time workers working 2,000 hours per annum.



Table 4
Incidence of non-fatal Injuries

US Private Industry Sector	Incidence of non-fatal Injuries and Illnesses with days away from work per 100,000
Agriculture, Forestry, Fishing & Hunting	1,890
Mining	579
Manufacturing	990
Construction	1,348
Services	891
All Private Industries	939
IRATA International	211

In this respect, US figures are comparable to those in this report because the IRATA population has been reduced to the same 2,000 hrs/annum basis. 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 19, giving a rate of $19 \times 11.1 = 211$ injuries/illnesses per 100,000. This figure is added to the BLS summaries in the table below.

The US figures selected relate to those taking time from work as a result of injury and illness at work and may include job transfer or job restriction cases. However, the IRATA figure is still well below all US figures and only 22% of the 'All private industry' rate. (Note: Fatality rate comparisons are dealt with in 5.2).

Despite adopting pessimistic assumptions and allowing for significant differences in reporting in all cases above, there can be little doubt that IRATA members continue to enjoy an enviable safety record with an injury rate only a small percentage of the injury and illness figures presented by UK, Eurostat and USA agencies.

5.3 Working 'On Rope'

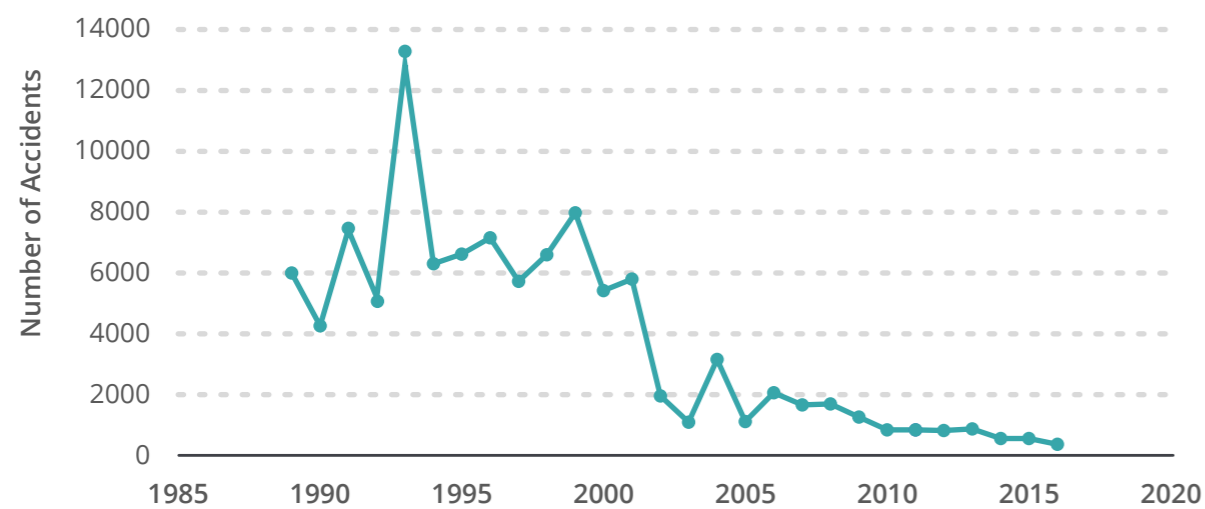
There is natural interest in 'On Rope' working in isolation. The statistics are summarised below. The number of all injuries and instances of ill health during on rope working for 2016 was as follows:

Fatality	1	(Reportable)
Major Injury	2	(Reportable)
Over 7 Day Injury	1	(Reportable)
Less than 7 Day Injury	13	(Including strains/sprains and ill health)
TOTAL	17	

(Note that the total includes the fatality and, hence, maintains the pessimistic comparative approach.)

The total hours worked on rope in 2016 was 9.2 million hours (excluding training hours on rope, adding to a pessimistic approach). Thus, the accident rate per 100,000 hours is given by total injuries x 100,000 / total work hours on rope = $17 \times 10^5 / 9.2 \times 10^6 = \sim 0.185$ all injuries per 100,000 hours or, more conventionally, the figure would be 368 all injuries per 100,000 workers, based on 2,000 hours per person per annum (full time equivalent workers). A graphical presentation of the accident rate per year is shown in Fig 51. Table 1 in appendix is a compilation of data since 1989 and is extended to include the above figures.

Fig 51 • Rate for all 'On Rope' Accidents



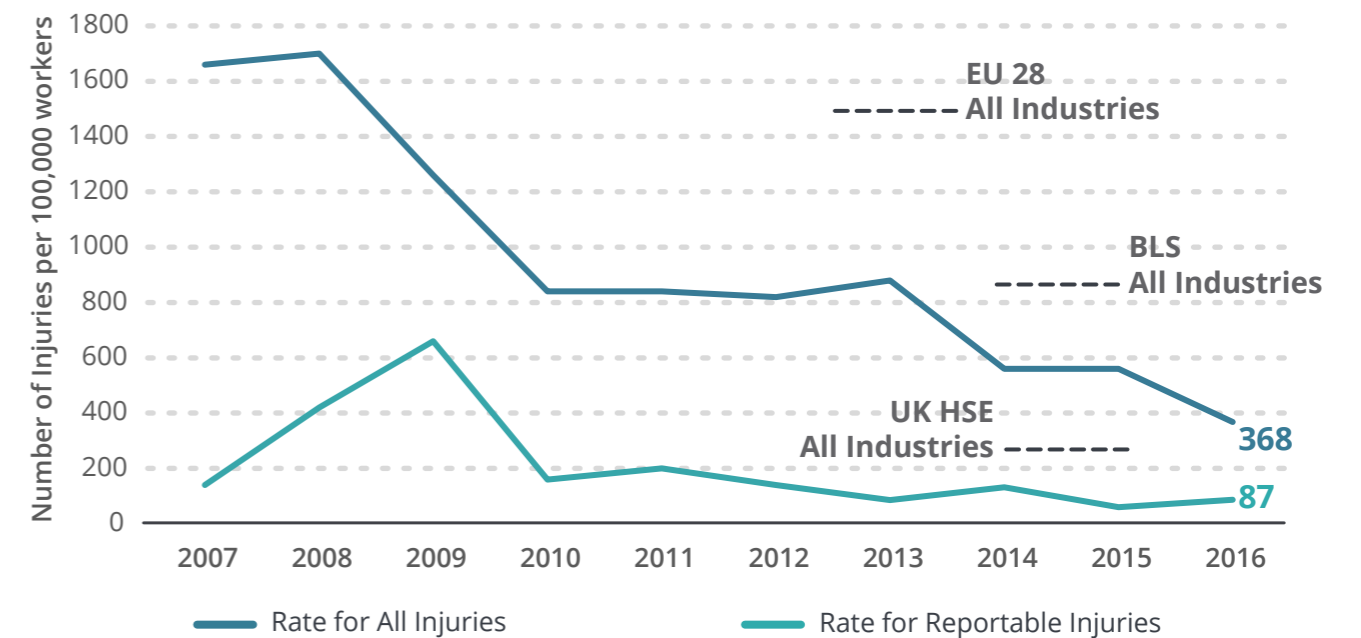
(Note that the graph and Table 1 in appendix are based on 100,000 workers)

It is emphasised that the graph is based solely on accidents that occurred whilst on ropes and includes all accidents including 'Less than 7 Day injuries' and fatalities. Thus, it must not be compared to other sources of data that are based on reportable accidents.

To compare data it is necessary to consider the reportable injuries and this appears in fig 52, extracted along with the 'All Injury' data from Table 1 in appendix. It is limited to the last 10 years because prior data is erratic and, if included, would require a logarithmic plot. This would effectively mask the relatively small variations now encountered. Superimposed on the plots in fig 52 are the average 'all industry' figures from EU 28, BLS and UK HSE data but, as noted in previous text, these are not directly comparable.

Alongside the 'Reportable injuries' line is a section of the 'All injuries' graph from fig 51. If only reportable events on rope were considered, the rate would be $4 \times 10^5 \times 2000 / 9.2 \times 10^6 = 87$ per 100,000 workers, as plotted in fig 52, marginally less than the overall figure of 89 per 100,000 as revealed in 5.1. Thus, there is no significant difference between the injury rate working 'On Rope' and 'Other' working.

Fig 52 • 'On Rope' Injuries 2007 - 2016



The Fatality

The single reported fatality was a sad reminder of the need for continuous vigilance to ensure the safety of rope access technicians and not just in relation to physical hazards but to potential medical threats also. Previous fatalities also occurred in 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-year period. The latter has been selected to coincide with available data.

Over the five-year period, 2012-2016, the three fatalities would represent a fatality rate of 3 in a 'working' population of 63,600 (from accumulated employment data over the five-year period). This gives a fatality rate of 4.6 per 100,000 workers. The UK HSE figure for 2015/16 was 0.52 per 100,000 for a 5 year average. The EU28 figure for 2014 was 1.8 per 100,000 with countries reporting various rates – for example Germany 1.09, France 2.7 and some up to approximately 4.5. US data for 2015 gives an 'All Private Industry' average of 3.4 per 100,000 workers; this is of the same order as that for the calculated five-year average here. The table below summarises the comparisons.

But, inevitably, the true impact of the fatality for family and friends of the deceased cannot be measured in mere numbers.

Table 5
Fatality Rate Comparisons

Source	Fatality Rate (per 100,000 persons)	Notes
IRATA	4.60	5 year s/ average
UK - HSE	0.52	5 year s/ average
EU 28	1.80	range for EU ~1 -45
USA - BLS	3.40	all private industries

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

<http://www.hse.gov.uk/statistics/fatals.htm>

<https://www.bls.gov/iif/oshwc/cfoi/cfch0014.pdf>

As a mark of respect, this page is printed black.



PHOTO BY SPIDERTECH

5.4 Accident and Incident Data & Regional Advisory Committees

No attempt was 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.
- **Presenting a ranking order conceivably could lead to a competitive attitude** and, counterproductively, may result in temptation to withhold submissions particularly for non reportable incidents where most data resides.
- **Finally, if low numbers of accidents and incidents** were distributed between 13 RACs, the resulting statistics would be virtually meaningless.

6

SUMMARY

Membership and Employment

- Membership had risen to 353 members by December 2016 based on submissions.
- Average employed dropped slightly to 13,100 but the number of qualified technicians increased to 11,260 with significant increases in L2 and L3 technicians. The number of managers remained virtually constant at 599 worldwide.
- Total work hours fell significantly from 23 to 18 million hours with wide variations between Regional Advisory Committees, some gaining and some losing work hours.
- An additional 470,000 hours were spent by trainees on training.
- Hours spent 'On Rope' fell from 11.3 to 9.2 million work hours.
- Hours spent working onshore was 9.8 million and 7.9 million offshore.
- Major reductions in work hours were recorded for L3 (1.2 million lower) and L1 (2.6 million lower) technicians.

Accident and Incident Reports

- Accident and incident submissions totalled 108, distributed as follows:
 - 1 Fatality
 - 3 Major Injuries
 - 4 Serious injuries (Over 7 Day Injuries)
 - 29 Minor injuries (Less than 7 Day Injuries)
 - 71 Dangerous Occurrences
- There were only 8 'reportable' accidents, four 'On Rope' (including the fatality) and two during training.
- On a 'time at risk' basis, training exceeds other 'locations' injury rates with 7 injuries out of twelve events reported. There was no significant difference between injury rates 'On Rope' and 'Other' working.
- Injury rates for working grades (L1 to L3) all remain within the range 2-4 per thousand.
- A total of 34 injuries were reported. Injuries to hands/fingers and face/eyes had both fallen, most vulnerable were legs. But, as usual, numbers overall were low.
- There were 26 instances of errors, omissions or equipment malfunction/mal-operation during rope handling and use. Three led to unrestrained descents, two of which resulted in serious injuries. Both cases occurred during rope transfer.
- Only 19 'falling objects' were reported but 18 were objects dropped by technicians. Some involved failed or ineffective lanyards/tethers.
- There were 5 instances of rope damage or severance but none were associated with injury.

Comparison of Accident Rates with All Industry Data

- A five year average for three fatalities (2012-2016) gave 4.6 fatalities per 100,000 workers. This is above other fatality rates except for some EU countries and close to the US BLS 'All Industry' rate of 3.4.
- The reportable injury and illness rate of 78 per 100,000 workers, however, remained well below all international statistics for reportable injuries in the range 6-35% of all latest available comparable rates provided by UK HSE, Eurostat EU28 and USA BLS.

CONCLUSIONS

The following conclusions are based on examination of the employment data and accident and incident reports supplied by member companies during 2016, as summarised and compiled by IRATA Head Office:

- 1. IRATA membership continued to increase**, accompanied by small increases in employment of qualified technicians. Overall employment fell slightly due to reductions in 'Other' employed personnel.
- 2. Work hours decreased to 18 million**, mainly because of reductions in L1 and L3 work hours. Reductions were sporadic with some RACs recording increases whilst others showed losses. This implies that changes were not due to changes in reporting but, more likely, variations in regional working demands.
- 3. The injury and illness rate remained well below all industry international figures**, reflecting a continuing excellent safety record. The single fatality contributed to a five-year fatality rate that marginally exceeded most other international statistics. The highest injury rate, on a 'time at risk' basis, was sustained during training.
- 4. The low level of reported events**, particularly 'Dangerous Occurrences', in relation to the overall employment level and hours worked, continues to be of concern.
- 5. A number of areas identified in the limited accident and incident reports** highlighted for particular attention, based on frequency and/or potential serious consequences, included:
 - Lapses, errors and omissions during 'On Rope' working
 - Working in hot/humid conditions
 - Isolation failures

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RECOMMENDATIONS

1. Given the limited collective data on accidents and incidents, health and safety could be further improved by:
 - a) Closer supervision and increased attention to rigging and rope related practices to ensure compliance with rope access procedures at all times. This is particularly the case during training.
 - b) Better recognition and supervision of working in hot/humid conditions including those in confined spaces.
 - c) Supervisors and managers ensuring that, before work commences, all necessary isolations are in place and are effective.
2. Repeatedly, members have been reminded of the requirement to report all accidents, incidents and events with potential to cause injury or fatality. It is recommended that the IRATA Executive address this issue with the membership to seek positive means to rectify a clear and continuing deficiency in reporting of incidents.

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. This report contains public sector information published by the Health and Safety Executive and licensed under the Open Government Licence.





APPENDICES

Accident Rates for 'On Rope' Working 1989-2016

Year	No. 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
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 (x 2000 x 100,000)

*** Col 4 + 5 divided by col 3 then x 2000 x 100,000

APPENDICES

Summary of Employment by RAC and Grade 2016 Averaged Quarterly Numbers

Regional Advisory Committee	Managers	L3	L2	L1	Other
Australia	57	417	158	451	25
Benelux	28	113	74	97	23
Brazil	30	126	86	205	119
D-A-CH	7	14	9	7	7
Mediterranean	8	17	7	14	10
Middle East	46	234	294	519	248
North America	36	178	141	346	25
North Sea Operators	42	596	282	698	278
Other	80	366	263	477	116
Scandinavia	21	65	40	56	13
South Africa	18	139	121	149	73
South East & Far East Asia	53	380	353	566	74
United Kingdom	174	1,129	667	1,409	231
Total	599	3,773	2,494	4,993	1,241

Summary Data of Working Hours 2016 Hours Worked by Location

Regional Advisory Committee	'Onshore' On Rope	'Onshore' Other	'Offshore' On Rope	'Offshore' Other	Training (being trained)
Australia	779,551	333,598	141,918	83,138	35,420
Benelux	142,309	68,441	56,716	32,616	7,697
Brazil	34,689	109,244	203,934	161,471	52,639
D-A-CH	18,099	22,116	0	0	2,479
Mediterranean	17,289	23,853	304	731	6,509
Middle East	1,061,262	1,011,436	271,657	289,132	34,794
North America	351,440	265,243	48,474	56,640	29,305
North Sea Operators	291,918	611,052	879,563	1,622,469	9,441
Other	331,989	396,889	508,456	334,561	70,904
Scandinavia	138,099	63,746	23,368	14,467	2,934
South Africa	38,702	214,547	294,186	203,251	13,198
S. East and Far East Asia	654,131	474,458	535,928	193,892	52,103
United Kingdom	1,247,570	1,088,715	1,160,831	772,843	93,104
Total	5,107,047	4,683,337	4,125,335	3,765,210	410,527



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