european downstream oil industry safety performance

statistical summary of reported incidents – 1998

Prepared for the CONCAWE Safety Management Group by

D.E. Martin (Technical Coordinator)

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ABSTRACT

This report is the fifth by CONCAWE reviewing the safety performance of the downstream oil industry in Europe. The area of coverage is primarily the EU, EEA and Hungary, but for some companies the data for other European countries such as Poland, Czech Republic, Turkey, etc. is included. The report includes the results of 27 companies which together represent over 90% of the oil refining capacity in the region. This is the same number as last year but includes one company reporting for the first time. This was compensated by the merger of two companies who this year returned a combined report. Of the 27 companies, 21 gave data for both contractors and employees. It is therefore a representative sample of the industry. However, as the data for some companies is incomplete, all results are quoted as frequencies.

The data covers the year 1998 and is compared with the averages for the five year period 1993 to 1997. Overall, the reported hours worked by company staff and contractors combined were about 470 million with an average Lost Workday Injury Frequency (LWIF) of 4.5 which is very similar to those reported in previous years which ranged from 4.0 to 4.7, and with the average for the years 1993 to 1997 of 4.5. However, it is lower than for any of the previous year's figures apart from 1994 when only 17 companies reported.

A range of other measures of safety performance are also reported. The responsible management of safety in the oil industry has resulted in a low level of accidents compared to other industries in Europe despite the intrinsic hazards of the materials handled and the operations carried out. In addition, nearly all the fatalities reported were unconnected with these hazardous properties and mainly resulted from road accidents and criminal actions.

In general, the safety performance for the companies reporting was similar (and if anything, slightly better) in 1998 to the performance reported previously for 1993 to 1997.

KEYWORDS

Accidents, AIF, CONCAWE, fatality, incidents, injury, LWI, LWIF, marketing, oil industry, refining, RWI, safety, statistics

CONTENTS

SUMMARY

The importance of collecting and analysing accident data to measure safety performance is recognised throughout the oil industry. A number of key statistics have been identified which are measured by the majority of oil companies operating in Western Europe.

This year, 27 companies operating in the downstream oil industry in Western Europe submitted statistics for this CONCAWE report on safety performance. These companies represent over 90% of the refining capacity in the area. The data cover the year 1998 and are for both the Manufacturing (Refining) and Marketing sectors of the industry. The area of coverage is primarily the EU, EEA and Hungary, but for some companies the data for other European countries such as Poland, Czech Republic, Turkey, etc. is included.

Not all companies operate in both the manufacturing and marketing areas, nor do they all collect the full range of data requested. To allow for this fact, nearly all the data is reported in terms of incident frequencies. The figures therefore, provide a reasonably representative measure of downstream industry safety performance

Accident frequencies in the downstream oil industry in Western Europe are now at low levels and have been maintained so throughout the period of reporting. Overall, the 1998 performance appears similar to and possibly somewhat better than for the previous five years.

From the data submitted it is apparent that there are considerable variations in the results reported by individual companies. Such variations provide a valuable pointer for member companies to identify areas for improvement.

1. INTRODUCTION

This report represents statistical data relating to safety performance in the downstream oil industry in Western Europe collected by CONCAWE. The purpose of collecting the information was twofold:

- to allow member companies to compare their performance against industry norms (*ie* benchmark) so that they can determine the efficacy of their management systems and highlight any deficiencies so that corrective action can be taken.
- to demonstrate that the responsible management of Safety in the downstream oil industry results in a low level of accidents despite the hazards intrinsic to its operations.

This report is the fifth annual report on this subject. The first report [1] covered the years 1993 and 1994, further reports covered 1995, [2] 1996, [3] 1997. [4] The last of these reports also gives an overview for the five years 1993 to 1997. This report covers 1998 performance and compares it with that for the previous five years. The questionnaire used to collect the data was similar to that used for the previous surveys. As last time, a simple explanation of the causes of fatalities was also asked for.

The definitions of the terms used in the survey and hence reported on were unchanged. Although it was recognised that not all companies use exactly the same methods at present, companies were encouraged to report what information they had available even if the definitions they used were not identical. Such differences are believed to be not significant when the statistics are aggregated. However, care needs to be taken when comparing companies as the assumptions used may not be the same.

27 member companies responded this time. This is the same number as last year but includes one company reporting for the first time. This was compensated by the merger of two companies who returned a combined report. The report now includes all of the CONCAWE membership which operate refineries and over 90% of the Western European refining capacity. It was notable that the majority of these were willing for their data to be shared openly with other companies. This free exchange indicates that they felt that they could both learn from the experience of others and help other companies even though they are competitors.

The results this year have not been compared with those from the USA, the upstream oil industry or other European industries. This is because efforts have been made to publish this report earlier in the year before results from these other areas have been published.

2. RANGE OF STATISTICS COLLECTED

Not all companies measure their safety performance in the same way or collect the same statistics. To take account of the fact that not all companies could supply data in all of the sections the results are expressed in terms of frequencies per hours worked. The safety performance statistics collected (for definitions see **Appendix 1)** were :

- Lost Workday Injury Frequency (LWIF)
- LWI Severity (days lost per accident) (LWIS)
- All Injury Frequency (AIF)
- Road Accident Rate (RAR)
- Fatalities

The data survey provided a detailed breakdown of key safety statistics. These were split between:

- employees
- contractors

and also between:

- manufacturing (refining)
- marketing including all non refining activities including “Head Office” staff.

The request form was similar to that used in previous surveys except that this year, companies were also asked for brief descriptions of fatal accidents. The area of coverage is primarily the EU, EEA and Hungary, but for some companies the data for other European countries such as Poland, Czech Republic, Turkey, etc. is included.

3. FINDINGS - 1998

Accident frequencies in the downstream petroleum industry are at low levels when compared to other industries.[4] With the low level of incidents, the differences year on year are probably not significant, particularly when the changes in the number of companies reporting over the period is considered. The figures for 1998 are in general similar to average for the five years 1993 to 1997 and if anything, slightly better. This improvement is more marked if only the seventeen companies which have participated in all six years of the survey are considered (see **Section 4**).

A summary of the 1998 results compared to those from previous years and the previous 5 year average is provided in **Table 1**. This year, a total of 27 companies reported. This is the same number as last year but includes one company reporting for the first time. This was compensated by the merger of two companies who returned a combined report.

In **Table 1**, the All Injury Frequency (AIF) is only calculated for those companies who reported either or both of Restricted Work Injuries (RWI) or Medical Treatment Cases (MTC). Similarly, LWIS figures exclude data where number of days lost was not recorded.

Table 1 Comparison of Representative Data for 1993 to 1998

Year - No of Companies	Fatalities	FAR	LWIF	LWIS	AIF	RAR
1993 - 17 companies	18	5.0	4.7	25.7	8.0	3.8
1994 - 17 companies	20	5.4	4.0	24.4	8.3	3.1
1995 - 22 companies	13	3.6	4.6	24.0	11.2	2.6
1996 - 28 companies	14	3.3	4.7	19.5	10.8	2.0
1997 - 27 companies	15	3.4	4.6	22.8	11.4	1.9
1998 - 27 companies	12	2.6	4.5	21.2	9.9	1.5
1993-1998 average	15.8	4.1	4.5	23.5	10.0	2.4

The aggregated accident data collected from CONCAWE members for 1998 is summarised below in **Table 2**. The range of results expressed in graphical format is shown in **Appendix 2**. It should be noted that in these figures, a zero result usually means that no data was reported for this determinant. However, in a few cases, there were no incidents so that the frequency was actually zero. These cases are indicated on the figures. In each case, the 1998 figures are compared to the average for the previous five years, or for as many years as the company has submitted data. It can be observed that in some cases there are wide differences between the 1998 data and the averages for the years 1993-1997. These mainly represent areas where only a small number of man-hours were recorded when a small change in the number of incidents give a disproportionate change in the frequency.

3.1. HOURS WORKED

In 1998, the total reported hours worked (**Table 2**) by employees and contractors at 470 million were about 30 million more than for 1997. One third of the increase results from the new company. Of the rest, the largest increase is again in the Marketing Contractor sector.

Table 2 Aggregated Results for the Twenty-seven Companies which Reported in 1998.

Sector	**Manufacturing**			**Marketing**			**Both Sectors**		
Work Force	Own Staff	Contr-actors	All Workers	Own Staff	Contr-actors	All Workers	Own Staff	Contr-actors	All Workers
Total hours worked (million)	108	60	168	183	118	301	292	178	470
Number of fatalities	1	0	1	3	8	11	4	8	12
Number of LWIs	509	559	1,068	625	413	1,038	1,134	972	2,106
Total days lost through LWIs	11,207	10,954	22,161	10,810	4,754	15,564	22,016	15,708	37,724
Number of RWIs	95	113	208	247	69	316	342	182	524
Number of MTCs	1,001	707	1,708	484	196	680	1,485	903	2,388
AIF	10.8	25.1	15.6	7.7	5.9	7.0	8.8	11.6	9.9
LWIF	4.7	9.3	6.3	3.4	3.5	3.4	3.9	5.5	4.5
LWI Severity (Days/LWI)	19.9	23.9	21.8	21.4	18.6	20.5	20.6	22.0	21.2
Distance travelled (million km)									369
Number of Road Accidents									540
Road Accident Rate									1.5

Note: The values for AIF and LWIS are calculated after excluding the hours for companies which do not record these data. Therefore, they cannot be calculated from the figures in this table.

3.2. LOST WORKDAY INJURY FREQUENCY (LWIF)

All companies without exception collect employee LWIF data for at least their own staff and this is therefore the most representative statistic of all. In 1998, the LWIF calculated overall was 4.5 compared to 4.6 in 1997, 4.7 in 1996, 4.6 in 1995, 4.0 in 1994 and 4.7 in 1993.

The performance of individual companies varied widely as shown in **Figures 1 to 3 and Figures 7 to 9**. The overall figure for contractors (all companies) was slightly higher than for employees (5.5 as against 3.9) and as in previous years, contractors operating in refineries had an LWIF (9.3) nearly twice that of employees (4.7). In the marketing sector, contractors (3.5) and staff (3.4) recorded a very similar LWIF.

3.3. LWI SEVERITY (LWIS)

LWI Severity as measured by the number of days lost per incident has shown a slightly improving trend falling from 27.4 days in 1993 to 21.2 days in 1998 (**Figure 13**). This figure is reasonably consistent across all the sectors reported varying from 18.6 to 23.9 days per incident. These figures are calculated excluding the results from those companies that do not record the number of days lost. As a result, the value for LWIS cannot be calculated from the figures in **Table 2**.

3.4. ALL INJURY FREQUENCY (AIF)

All Injury Frequency becomes a more meaningful measure of safety performance as LWIF declines to the low levels now experienced. AIF enables us to get a better picture of the total safety performance of the industry since it records fatalities, restricted work injuries (RWI) and Medical Treatment Cases (MTC) in addition to LWI. Over the years 1993 to 1997, the AIF increased from 8.0 in 1993 to 11.4 in 1997. It is believed that this did not represent an increase in the number of incidents, but rather better reporting of minor incidents. Each year, more companies reported either or both RWI and MTC.

This year, 24 companies reported such data, the same number as in 1997. It should be noted that not all companies operate the restricted work system and restricted working is not allowed in some countries, but as last year, the AIF figures in the tables were calculated using data from only those companies who reported either RWI or MTC data or both. As a result, the value for AIF cannot be calculated from the figures in **Table 2**.

The overall AIF recorded this year was 9.9 which is lower than for 1997 and very similar to the average for the years 1993 to 1997 (10.0).

Again, the performance between the various companies varied widely as shown in **Figures 4,5,6** and **10,11,12**. It should be noted that the criteria for defining MTC varies between companies. In these figures, the results of all companies are shown, whether or not they reported both RWI and MTC data. For companies who do not report either RWI or MTC, the AIF shown are the same as the LWIF in the corresponding figures.

3.5. ROAD ACCIDENT RATE (RAR)

Road Accident Rate data was supplied by only ten companies this year, one less than for 1997. This has led to a large reduction in the recorded number of kilometres (and accidents). Of those that did respond for this measure, very few companies recorded RAR for either the manufacturing or contractor sectors. Therefore, only the combined RAR data are reported in **Table 2** and **Figure 14**.

There has been a steady reduction in RAR from 3.8 in 1993 to 1.5 accidents per million kilometres in 1998. However, comparison of these data should be made with caution because of the small size of the database and changes in its composition. The ten companies who reported this time recorded that their vehicles (own and contractor) travelled 369 million kilometres in 1998 and were involved in 540 accidents ranging from minor to major.

3.6. FATALITIES

12 (4 employee, 8 contractor) fatalities occurred in 1998 in 12 separate incidents in six different companies. This was three less fatalities than 1997 (15 fatalities, 6 employees, 9 contractors) and was the lowest number recorded since the start of these surveys. As the reported number of hours worked has increased considerably over the period, the Fatal Accident Rate (FAR) has decreased from 5.1 fatalities per 100 million man-hours in 1993, to 2.6 in 1997, again, the lowest frequency recorded.

Because of the small numbers, fatalities are not a reliable indicator of safety performance. It has been noted in previous reports that transport related accidents were a consistent feature in all three years. Companies were again asked to give a brief description of the causes of fatalities and these have been categorised as shown in **Table 3**. It can be seen that no fewer than five of the fatalities (42%) were due to road accidents. A further four fatalities (33%) were as a result of criminal action and there was one fatality (8%) occurring in construction / maintenance activities. This leaves only two fatalities resulting from fire or explosion and therefore related to the hazardous nature of the materials handled. In the manufacturing sector, there was only one fatal accident.

Table 3 Causes of Fatalities in 1998.

	Manufacturing	Marketing	Combined	Percentage
Road Accident		5	5	42%
Construction/ Maintenance		1	1	8%
Criminal Action		4	4	33%
Fire / Explosion	1	1	2	17%
Total	1	11	12	100%

4. RESULTS FOR COMPANIES WHO HAVE REPORTED ALL YEARS

This is the sixth year that CONCAWE has collected data on the incidence of accidents in the downstream oil industry. Over the years, the number of companies responding to the survey has increased from 17 to 27. This increase in numbers reporting has tended to obscure the improvement in the safety performance of the seventeen companies who have reported throughout.

The results for 1998 for these companies are presented in **Table 4** and the summarised results for these same companies for the whole 6 years of the survey in **Table 5**. This table also compares the results for these companies with those for the complete set of 27 companies which reported in 1998.

The results show that the average LWIF, AIF and RAR are all lower for the original 17 companies in 1998 than those for all the 27 companies. Only the FAR and LWIS figures are slightly higher. What is more, there is a clear improvement over the years in the FAR, LWIF and RAR figures. This is shown more clearly in **Figure 16**. The picture for AIF is more complicated in that for this measure, the numbers increased from 1993 to 1995 but have reduced steadily since then. It is believed that the initial increase was due to better reporting in these companies, but that the decrease since then is due to an improvement in safety performance.

Table 4 1998 Results for the First Seventeen Companies.

Sector	**Manufacturing**			**Marketing**			**Both Sectors**		
Work Force	Own Staff	Contr-actors	All Workers	Own Staff	Contr-actors	All Workers	Own Staff	Contr-actors	All Workers
Total hours worked (million)	69	48	117	150	117	267	219	165	384
Number of fatalities	0	0	0	3	8	11	3	8	11
Number of LWIs	198	343	541	419	411	830	617	754	1,371
Total days lost through LWIs	5,800	6,692	12,492	6,348	4,744	11,092	12,148	11,436	23,584
Number of RWIs	76	105	181	237	69	306	313	174	487
Number of MTCs	272	368	640	408	192	600	680	560	1,240
AIF	8.1	18.1	11.7	7.3	5.9	6.7	7.6	8.8	8.1
LWIF	2.8	7.2	4.6	2.8	3.5	3.1	2.8	4.6	3.6
LWI Severity (Days/LWI)	31.4	27.5	29.2	21.2	18.8	20.1	25.0	23.1	24.0
Distance travelled (million km)									323
Number of Road Accidents									348
Road Accident Rate									1.1

Table 5 Results for the First Seventeen Companies Compared with All Companies.

Year	**FAR**	**LWIF**	**LWIS**	**AIF**	**RAR**
1993	5.1	4.7	25.7	8.0	3.8
1994	5.6	4.0	24.4	8.3	3.1
1995	3.8	4.5	20.7	11.1	2.4
1996	3.7	4.1	19.5	9.6	2.0
1997	4.0	3.7	22.0	9.3	1.7
1998	2.9	3.6	24.0	8.1	1.1
1998 - 27 companies	2.6	4.5	21.2	9.9	1.5

5. REFERENCES

1. CONCAWE (1996) European downstream oil industry safety performance. Statistical summary of reported incidents – 1993 & 1994. Report No. 1/96. Brussels: CONCAWE

2. CONCAWE (1996) European downstream oil industry safety performance. Statistical summary of reported incidents – 1995. Report No. 3/96. Brussels: CONCAWE

3. CONCAWE (1997) European downstream oil industry safety performance. Statistical summary of reported incidents – 1996. Report No. 4/97. Brussels: CONCAWE

4. CONCAWE (1998) European downstream oil industry safety performance. Statistical summary of reported incidents – 1997 and overview 1993 to 1997. Report No. 4/98. Brussels: CONCAWE

APPENDIX 1 EUROPEAN OIL INDUSTRY STATISTICS DEFINITIONS AND GUIDING NOTES

1. Hours worked Hours worked by employees and contractors. Estimates should be used where contractor data is not available.

2. Fatality This is a death resulting from a work related injury where the injured person dies within twelve months of the injury.

3. LWI Lost Workday Injury is a work related injury that causes the injured person to be away from work for at least one normal shift because he is unfit to perform any duties.

4. Total days lost The number of calendar days lost through LWIs counting from the day after the injury occurred.

5. RWI Restricted Workday Injury is a work related injury which causes the injured person to be assigned to other work on a temporary basis or to work his normal job less than full time or to work at his normal job without undertaking all the normal duties.

6. MTC Medical Treatment Case is a work related injury which requires the attention of a medical practitioner. It excludes first aid treatment.

7. AIF All Injury Frequency which is calculated from the sum of fatalities, LWIs, RWIs and MTCs divided by number of hours worked expressed in millions.

8. LWIF Lost Workday Injury Frequency is calculated from the number of LWIs divided by the number of hours worked expressed in millions.

9. LWIS Lost Workday Injury Severity is the total number of days lost as a result of LWIs divided by the number of LWIs.

10. Distance travelled This is the distance, expressed in millions of kilometres, covered by company owned delivery vehicles and company cars whether leased or owned. It should also include kilometres travelled in employee's cars when on company business.

11. Road Accidents Any accident involving any of the vehicles described above.

12. RAR Road Accident Rate is calculated from the number of accidents divided by the kilometres travelled expressed in millions.

13. FAR Fatal Accident rate is calculated from the number of fatalities divided by the number of hours worked expressed in hundred millions.

Statistics to be collected under two groupings : Refineries and Marketing.

Marketing includes all non refining activities including "Head Office" personnel.

Where data is not available the best estimate possible should be made.

APPENDIX 2 GRAPHS SHOWING SPREAD OF DATA

Figure 1 LWIF For Company Employees in European Oil Industry (Both Sectors)

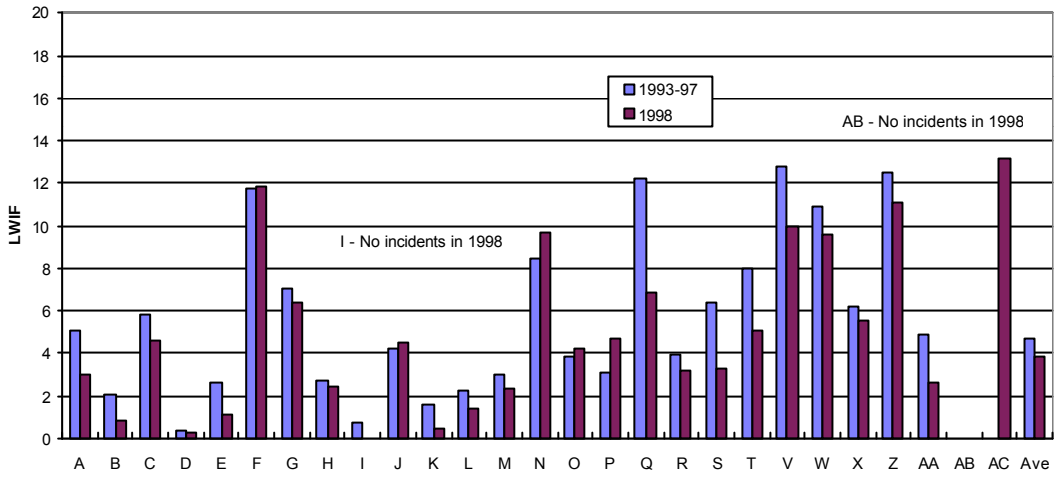


Figure 2 LWIF For Company Employees in European Oil Industry (Manufacturing)

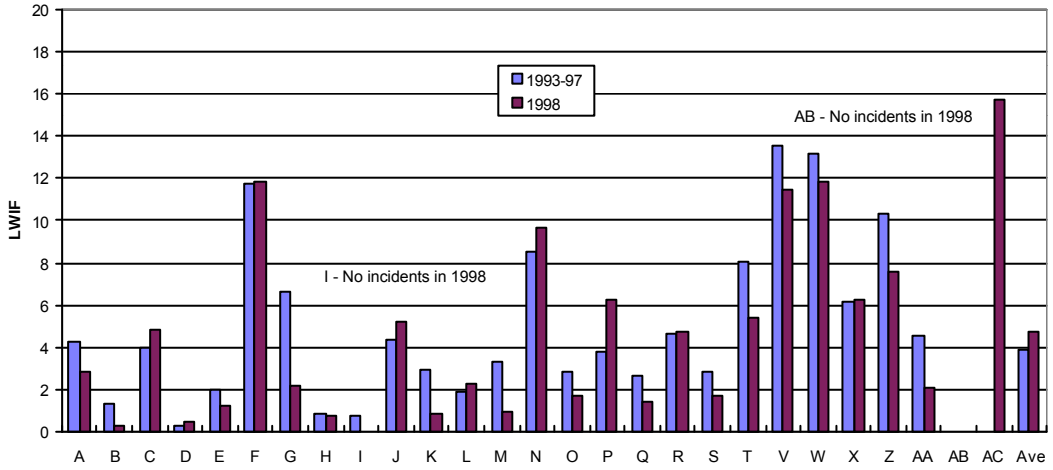


Figure 3 LWIF For Company Employees in European Oil Industry (Marketing)

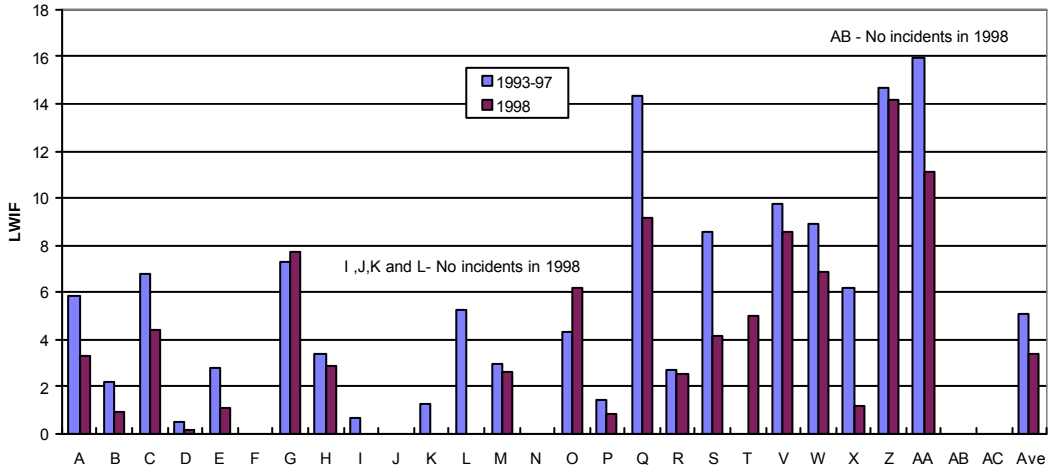


Figure 4 AIF* For Company Employees in European Oil Industry (Both Sectors)

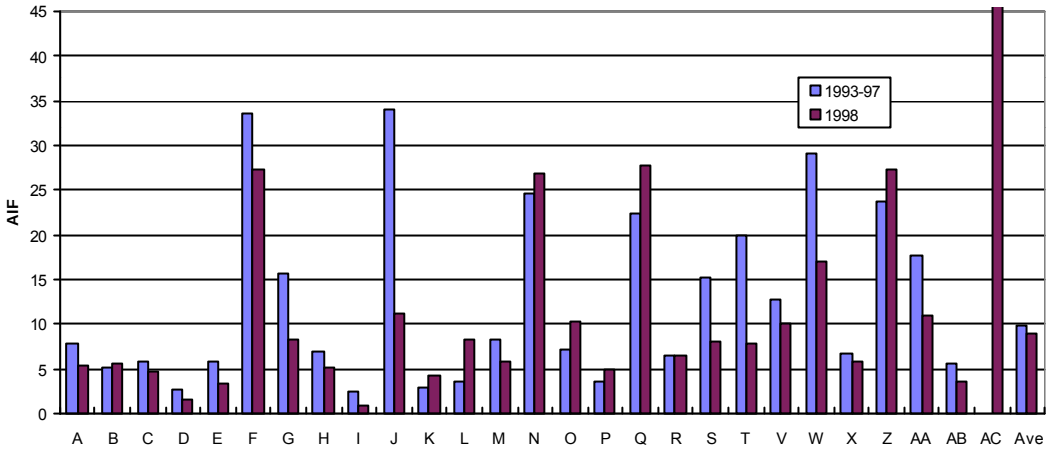


Figure 5 AIF* For Company Employees in European Oil Industry (Manufacturing)

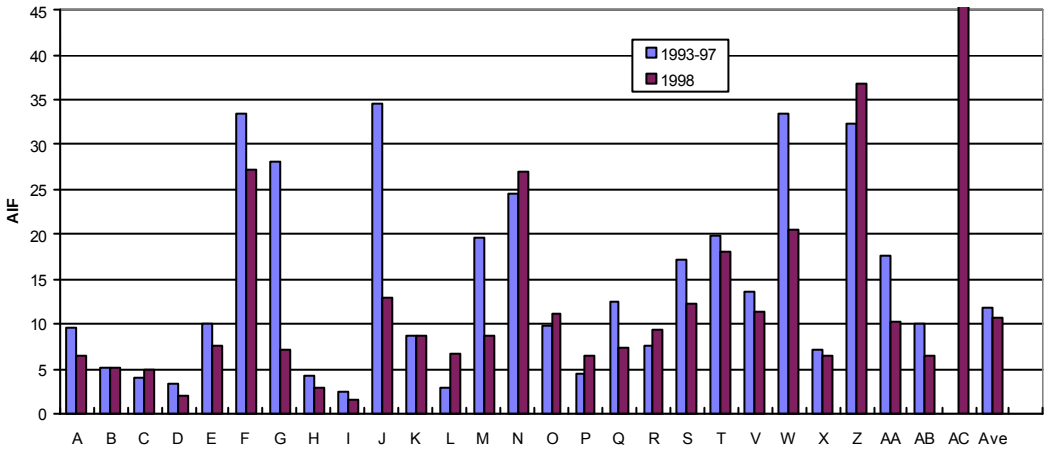
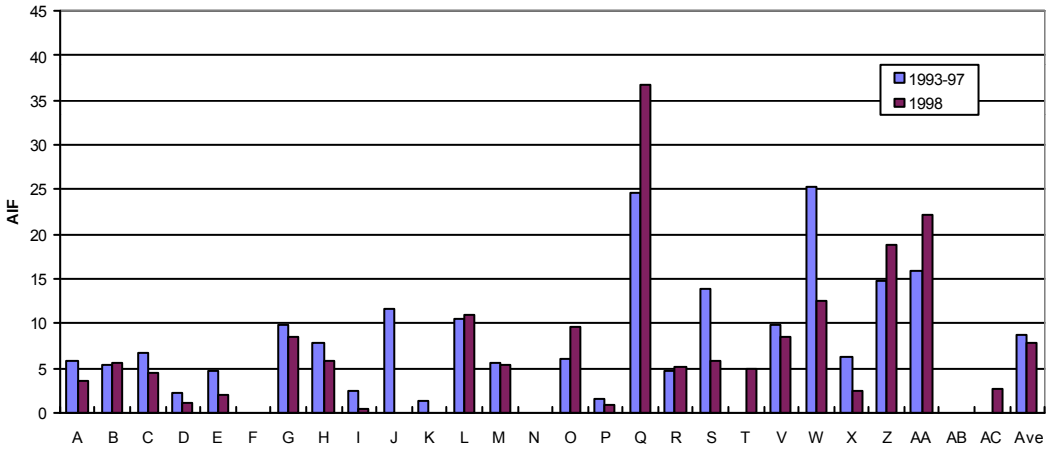


Figure 6 AIF* For Company Employees in European Oil Industry (Marketing)



***** Note that in these figures an AIF is recorded even if the company did not report any RWI or MTC. In these cases, the AIF is the same as the LWIF.

Figure 7 LWIF For Contractors in European Oil Industry (Both Sectors)

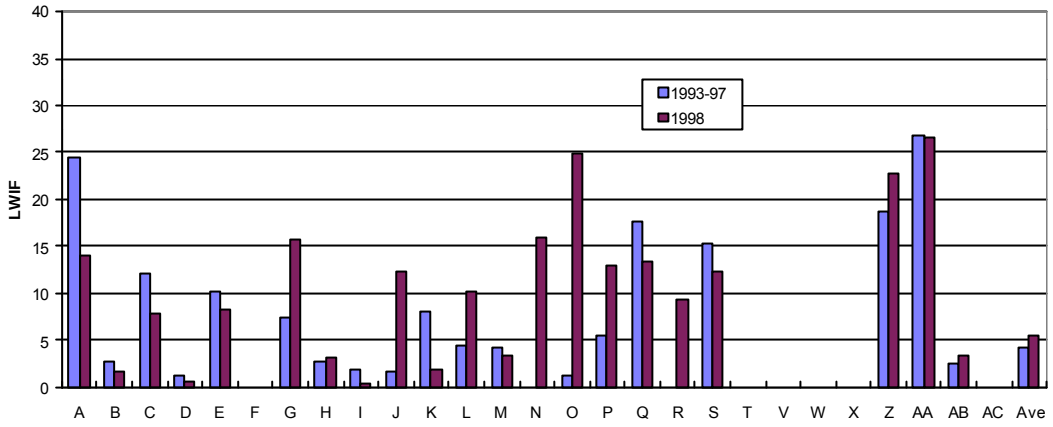


Figure 8 LWIF For Contractors in European Oil Industry (Manufacturing)

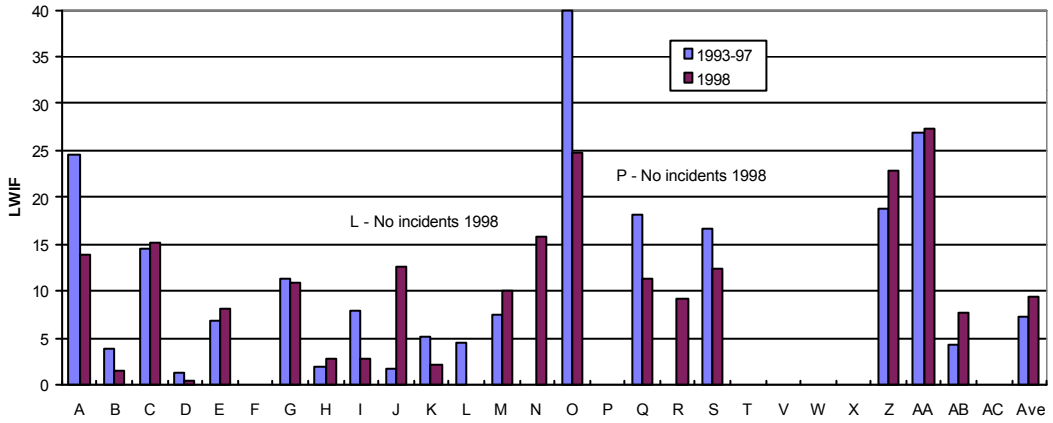


Figure 9 LWIF For Contractors in European Oil Industry (Marketing)

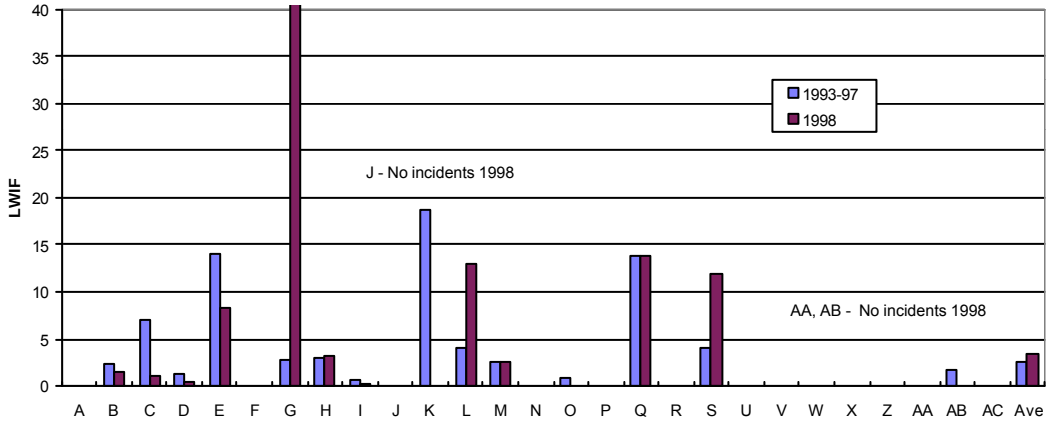


Figure 10 AIF* For Contractors in European Oil Industry (Both Sectors)

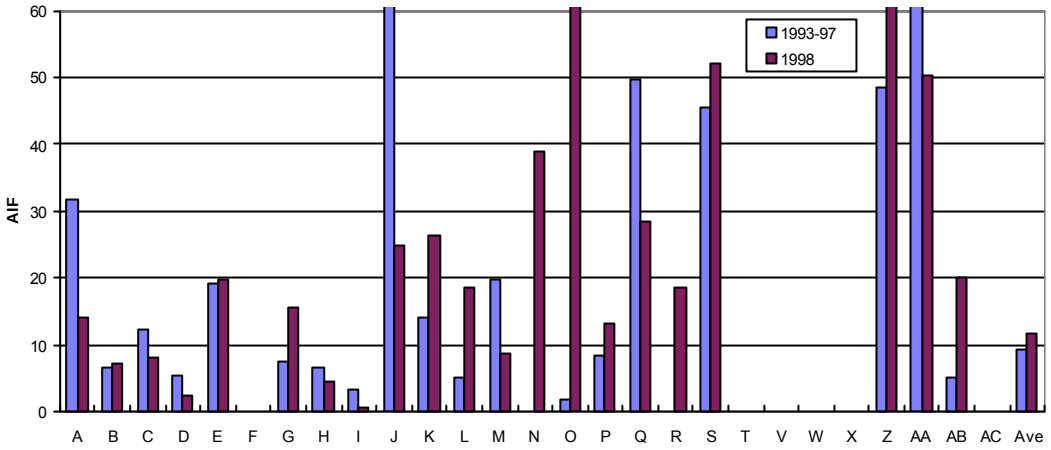


Figure 11 AIF* For Contractors in European Oil Industry (Manufacturing)

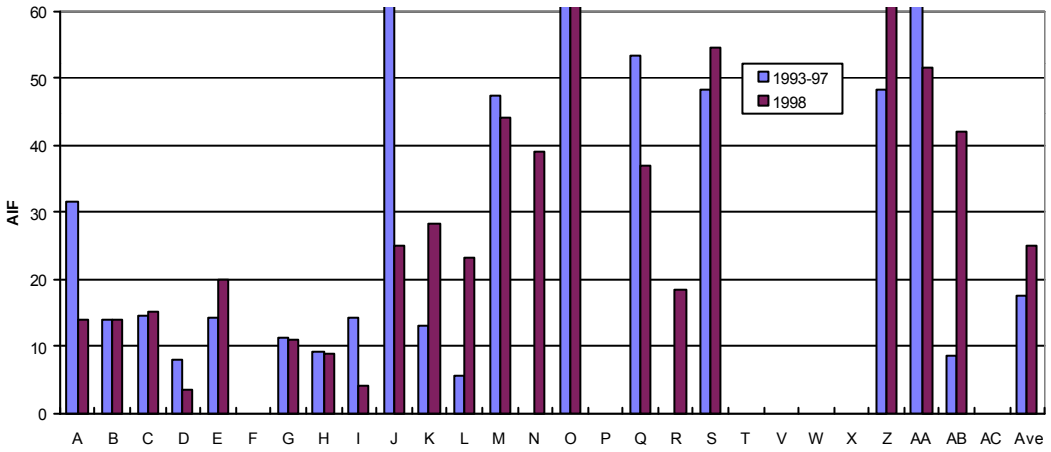
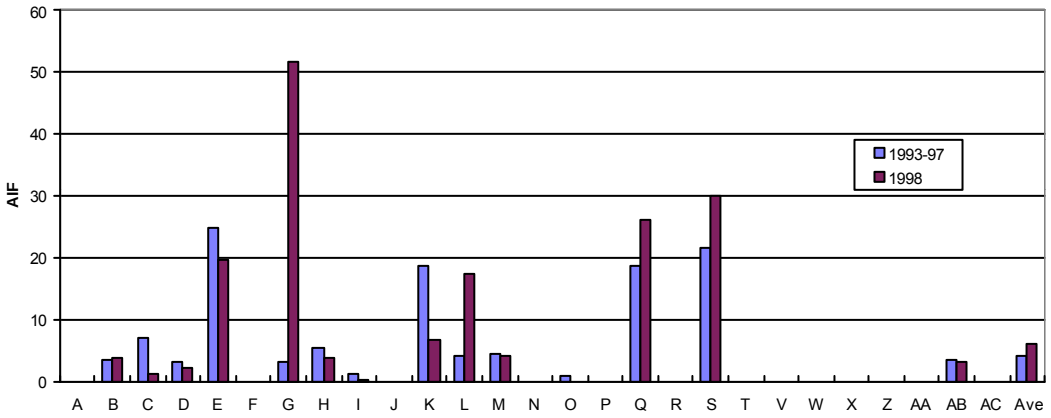


Figure 12 AIF* For Contractors in European Oil Industry (Marketing)



***** Note that in these figures an AIF is recorded even if the company did not report any RWI or MTC. In these cases, the AIF is the same as the LWIF.

Figure 13 LWIS For Employees in European Oil Industry (Both Sectors***)***

(Days Lost per Incident)

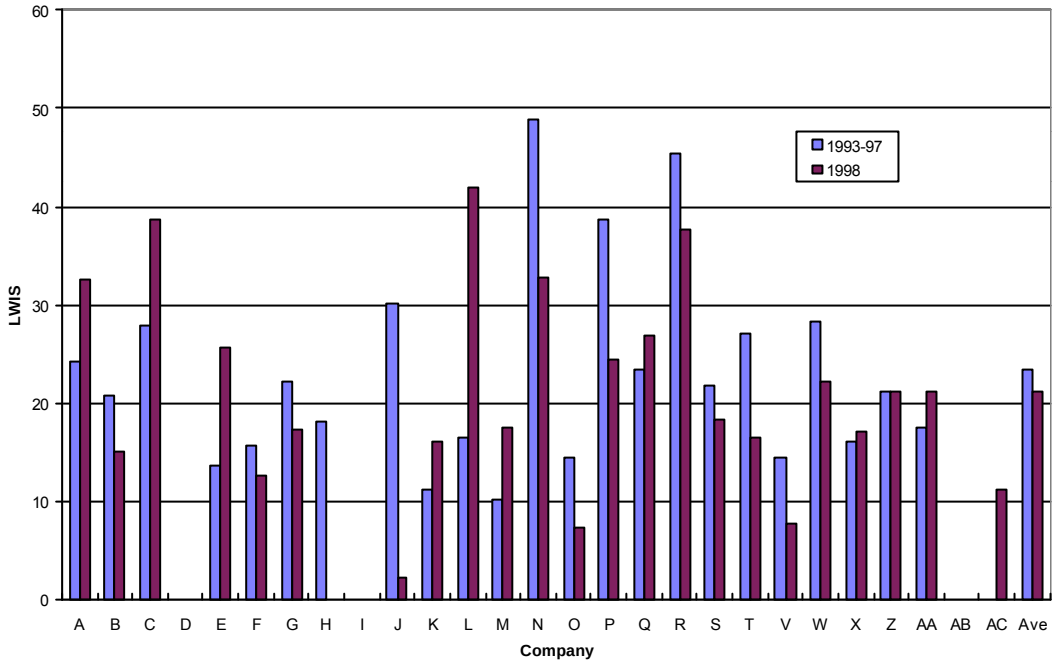


Figure 14 Road Accident Rate

(Accidents per Million Kilometres)

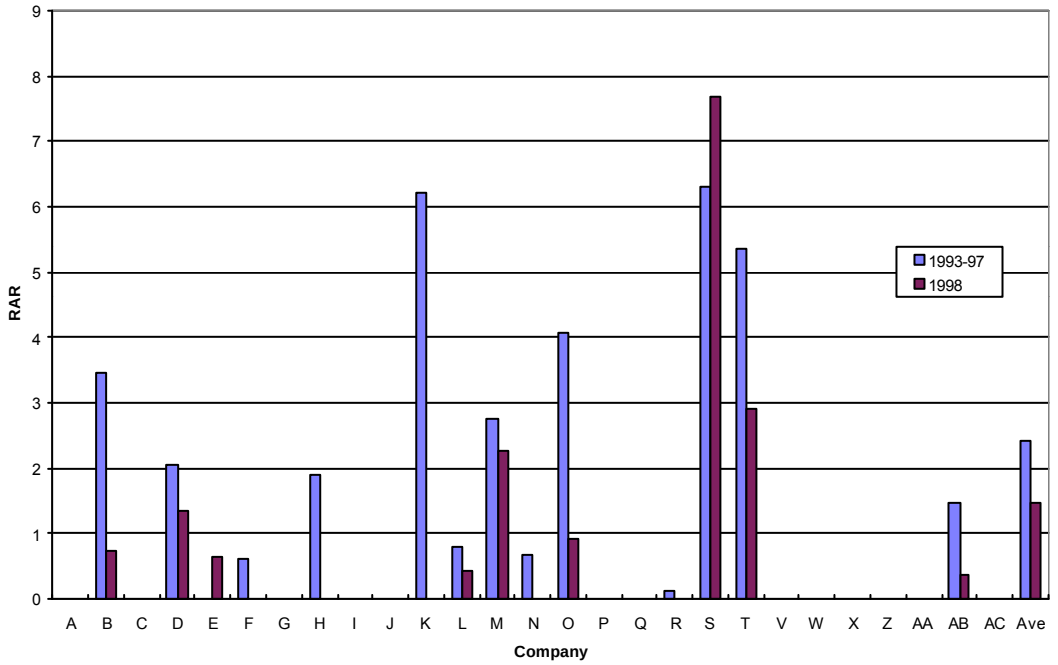


Figure 15 Fatalities for All Workers in European Oil Industry (Both Sectors)

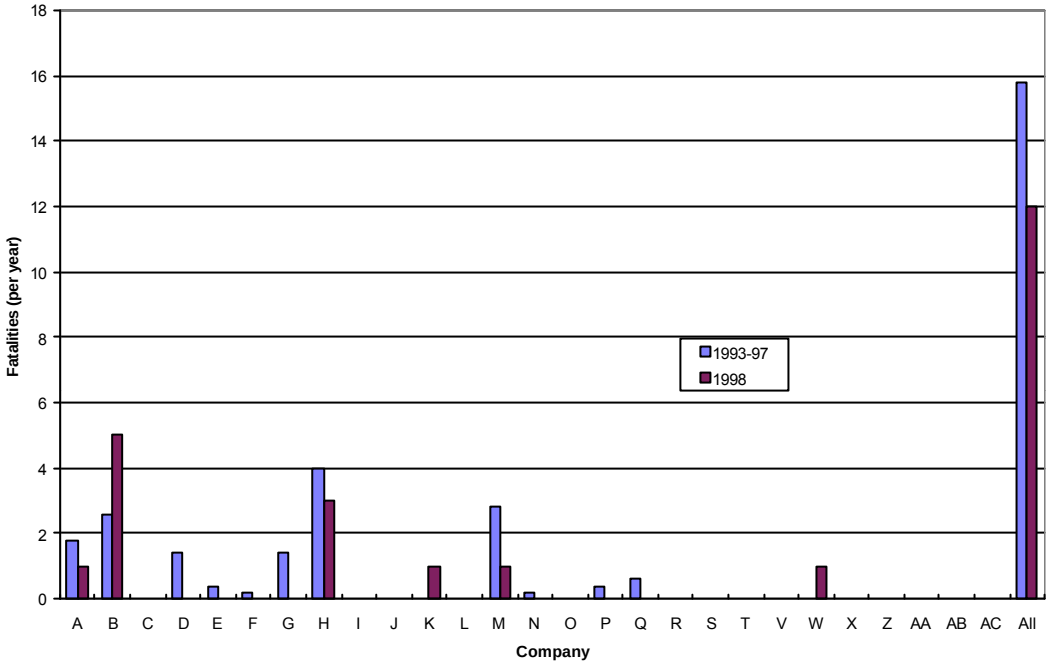


Figure 16 Six Year Data (1993-1998) for Companies which have Reported in All Six Years of the Survey.