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european downstream oil industry safety performance

statistical summary of reported incidents - 1996

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Prepared for the CONCAWE Safety Management Group by

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ABSTRACT

This report is the third by CONCAWE reviewing the safety performance of the downstream oil industry in Western Europe. It includes the results of 28 companies which together represent over 90% of the oil refining capacity in Europe. It is therefore a representative sample of the industry. However, as the data for some companies is incomplete, the most important results are quoted as frequencies.

The data covers the year 1996. Overall, the reported hours worked by company staff and contractors combined were about 420 million with an average Lost Workday Injury Frequency (LWIF) of 4.7 which compares with 4.6 in 1995, 4.0 in 1994 and 4.7 in 1993. A range of other measures of safety performance are also reported. The responsible management of safety in the oil industry resulted in a low level of accidents despite the intrinsic hazards of the materials handled and the operations carried out.

In general, the safety performance for the companies reporting was similar in 1996 to the performance reported previously for 1993,1994 and 1995.

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, twenty-eight companies (six more than last time) operating in the downstream oil industry in Western Europe submitted statistics for this CONCAWE report on safety performance. These twenty-eight companies represent over 90% of the refining capacity in the area. The data covers the year 1996 and is for both the Manufacturing (Refining) and Marketing sectors of the industry.

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 are now at low levels. Although not quantified in this report, the majority of companies advised for the last report that their safety performance had shown a steady year on year improvement prior to the years sampled. This trend of improvement appeared to continue in 1993 and 1994 but there was little or no apparent improvement in 1995. Overall, the 1996 performance appears similar to that for the previous three 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 third annual report on this subject. The first report [1] covered the years 1993 and 1994 and a second report covered 1995. [2] This report covers 1996 performance and compares it with the previous three years. The questionnaire used to collect the data was similar to that used for the previous surveys. This time, a question on the number of fatalities resulting from traffic accidents was added.

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.

Twenty-eight member companies responded this time (six more than last time), nearly all of the CONCAWE membership, representing 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.

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 is shown in **Appendix 3**.

3. FINDINGS

Accident frequencies in the downstream petroleum industry are now at very low levels. Although not quantified in this report, the majority of companies advised CONCAWE that their safety performance had shown a steady year on year improvement prior to 1993, the first year sampled in this series of reports. Although for the industry as a whole the performance appeared better in 1994 than 1993, the overall results for 1995 did not show a similar improvement. The 1996 performance was similar to that for 1995 but looking at the figures for the four years overall, it is evident that in general they are similar. With the generally low level of incidents, the differences year on year are probably not significant, particularly when the increase in companies reporting over the period are considered.

A summary of the 1996 results compared to those from previous years is provided in **Table 1**. This year, a total of 28 companies reported, All of the 22 companies which reported in 1995 and 6 companies reporting for the first time. To allow comparison with last year, the 22 companies who also participated last year are recorded separately. The last line of the table includes all companies reporting this year.

In **Table 1**, the All Injury Frequency (AIF) is only calculated for those companies who reported either or both of Restricted Work Injuries or Medical treatment Cases. Similarly, LWIS figures exclude data where number of days lost was not recorded. This treatment of the data differs from that used in previous years, but the changes have been applied retrospectively so that the numbers in this report for 1993 to 1995 differ slightly from those quoted in previous reports. More detailed comparisons for each determinant are given in following sections.

Table 1 Comparison of Representative Data for 1993, 1994, 1995 and 1996

Year - No of Companies	Fatalities	LWIF	LWIS	AIF
1993 - 17 companies	18	4.7	27.4	8.0
1994 - 17 companies	20	4.0	24.7	8.6
1995 - 22 companies	13	4.6	24.0	11.2
1996 - 22 companies	14	4.1	18.9	9.9
1996 - 28 companies	14	4.7	19.5	10.8

The aggregated accident data collected from CONCAWE members for 1996 is summarised below for the twenty-two companies which reported both this time and also in 1995 in **Table 2**. The results for all twenty-eight companies who reported for 1996 are given in **Table 3**. 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 (for 1996 only) are indicated on the figures.

3.1. HOURS WORKED

In 1996, the total reported hours worked (**Table 3**) by employees and contractors at about 420 million were about 55 million more than in 1995. The six companies reporting for the first time contributed about 40 million hours of the increase. This time, there were increases in reported man hours in all sectors.

Table 2 1996 Aggregated Results for the Twenty-two Companies which Reported in both 1995 and 1996.

Sector	Manufacturing		Marketing		Total		
Work Force	Own Staff	Contractor	Own Staff	Contractor	Own Staff	Contractor	All Workers
Total hours worked	89,200,403	53,594,257	162,553,266	75,707,501	251,753,669	129,301,758	381,055,427
Number of fatalities	0	3	2	9	2	12	14
Road Related Fatalities	0	0	1	3	1	3	4
Number of LWIs	294	405	685	194	979	599	1,578
Total days lost through LWIs	7,993	7,160	11,164	1,662	19,157	8,822	27,979
Number of RWIs	200	150	38	9	238	159	397
Number of MTCs	526	392	428	78	954	470	1,424
AIF	13.4	18.2	8.0	3.5	10.0	9.8	9.9
LWIF	3.3	7.6	4.2	2.6	3.9	4.6	4.1
LWI Severity (Days/LWI)	28.1	19.6	17.1	9.2	20.4	16.2	18.9
Distance travelled (million km)							694
Number of Road Accidents							1409
Road Accident Rate							2.0

Table 3 1996 Aggregated Results for the Twenty-eight Companies which Reported in 1996

Sector	Manufacturing		Marketing		Total		
Work Force	Own Staff	Contractor	Own Staff	Contractor	Own Staff	Contractor	All Workers
Total hours worked	104,455,832	59,684,971	180,481,305	75,977,501	284,937,137	135,662,472	420,599,609
Number of fatalities	0	3	2	9	2	12	14
Road Related Fatalities	0	0	1	3	1	3	4
Number of LWIs	412	493	883	195	1,295	688	1,983
Total days lost through LWIs	11,319	8,435	15,139	1,912	26,458	10,347	36,805
Number of RWIs	207	150	38	9	245	159	404
Number of MTCs	703	437	498	79	1,201	516	1,717
AIF	16.5	19.2	6.9	10.3	11.1	10.3	10.8
LWIF	3.9	8.3	4.9	2.6	4.5	5.1	4.7
LWI Severity (Days/LWI)	28.2	18.6	17.8	10.6	21.1	16.3	19.5
Distance travelled (million km)							705
Number of Road Accidents							1424
Road Accident Rate							2.0

3.2. LOST WORKDAY INJURY FREQUENCY (LWIF)

All companies without exception collect employee Lost Workday Injury Frequency (LWIF) data and this is therefore the most representative statistic of all. (**Table 3**). In 1996, the LWIF calculated overall was 4.7 compared to 4.6 in 1995, 4.0 in 1994 and 4.7 in 1993. The companies which reported for both 1995 and 1996 (**Table 2**) had a slightly better rate of 4.1. The performance of individual companies varied

widely as shown in **Figures 2 to 4 and 8 to 10**. The overall figure for contractors (all companies) was slightly higher than for employees (5.1 as against 4.5) but as in previous years, contractors operating in refineries have an LWIF (8.3) about twice that of employees (3.9). This trend is reversed in the case of marketing contractors who recorded a lower LWIF (2.6) than employees (4.9).

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 24.7 days in 1994 24.0 days in 1995 and 19.5 in 1996 (18.9 for the companies which reported for both 1995 and 1996).

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 lost workday injuries (LWI). The AIF was 8.0 in 1993, 8.6 in 1994 and 11.2 in 1995. The figure was much the same in 1996 at 10.8 (9.9 for the 22 companies which reported in 1995). It should be noted that not all companies operate the restricted work system and restricted working is not allowed in some countries.

This year, the figures in the tables were calculated using data from only those companies who reported RWI or MTC data. Again, the performance between the various companies varied widely as shown in **Figures 5,6,7** and **11,12,13.** In these figures, the results of all companies are shown , whether or not they reported RWI and MTC data. For companies who do not report RWI or MTC, the AIF shown are the same as the LWIF in the corresponding figures. Also, the 1996 average excludes these companies, but the averages for previous years do not.

3.5. ROAD ACCIDENT RATE (RAR)

Road Accident Rate data was supplied by only nine companies. Very few companies recorded RAR for either the manufacturing or contractor sectors. Therefore, only the combined RAR data is reported in **Tables 2 and 3** and **Figure 15**. There was a reduction in RAR from 3.9 to 3.2 between 1993 and 1994 and a further reduction in 1995 to 2.7 accidents per million kilometres. The improvement continued in 1996 with a reported RAR of 2.0 accidents per million kilometres. However, comparison of these data should be made with caution because of the small size of the database and changes in its composition. The nine companies who reported this time recorded that their vehicles (own and contractor) travelled 705 million kilometres in 1996 and were involved in 1424 accidents ranging from minor to major.

3.6. FATALITIES

14 (2 employees, 12 contractor) fatalities occurred in 1996. This was one more than 1995 (13 fatalities, 2 employees, 11 contractors) but both years showed a significant improvement on 1993 (18 fatalities, 4 employees, 14 contractors) and 1994 (20 fatalities, 16 employees and 4 contractors). As the numbers of hours worked has

also increased considerably over this period, the Fatal Accident Rate (FAR) has decreased by an even greater proportion; from 5.1 in 1993, (5.6 in 1994) to 3.3 in 1996.

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. This year, an additional question was asked about fatalities in road related incidents. The replies indicated that of the 14 fatalities, 4 (29%) were in road traffic accidents.

3.7. COMPARISONS WITH OTHER INDUSTRIES AND AREAS

Comparison of oil industry safety performance with other industries in Europe has proved difficult as in general safety statistics are either not collected or are not available on a Europe-wide basis. E&P Forum do collect a range of statistics for the upstream oil industry, including figures for Western Europe. [2]

Their operations differ considerably from the downstream oil business and comparisons should be made with caution. Nonetheless, downstream safety performance is comparable with exploration and production.

The only other area where comparable downstream data is available is for the US. Annually the API collate data on US occupational injuries, illnesses and fatalities for the petroleum industry. [3] Approximately 180-200 companies submit data to API each year on a voluntary basis. It should be noted that API data is for company employees only and contractor statistics are not recorded.

The CONCAWE statistics are compared with those collected for the USA (by API) and for the upstream industry (by E&P Forum) in **Table 4**. The LWI Severity category reported in the CONCAWE survey is comparable with the severity rate recorded by the API and E&P Forum.

Overall, the CONCAWE figures are in the same range as both the API and the E&P Forum statistics, particularly if the API figures are compared with the CONCAWE company employee figures.

Table 4 Comparison of Accident Statistics with Other Areas - 1996

Sector	Exposure	LWIF	LWIS	AIF	Fatalities	FAR
CONCAWE - All Workers						
Manufacturing	164.1	5.5	21.8	14.7	3	1.8
Marketing	256.5	4.2	15.8	6.7	11	4.3
Total	420.6	4.7	18.6	9.8	14	3.3
CONCAWE - Company Employees Only						
Manufacturing	104.5	3.9	27.5	12.7	0	0.0
Marketing	180.5	4.9	17.1	7.9	2	1.1
Total	284.9	4.5	20.4	9.6	2	0.7
API - Company Employees Only						
Refining	97.8	2.6	34.5	6.7	2	2.0
Marketing	101.9	3.0	18.6	8.2	1	1.0
Total	199.7	2.8	25.8	7.4	3	1.5
E & P Forum - All Workers						
Europe	197.2	3.7	32.6	8.9	7	3.6
World	911.5	2.7	20.7	5.8	74	8.1

Exposure is number of manhours worked expressed in millions
FAR (Fatal Accident Rate) is the number of fatalities per 100 million manhours worked

4. 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. E&P Forum (1997) The E&P industry safety performance – accident data 1996. Report No. 6.63/268. London: E&P Forum

4. API (1997) Summary of US occupational injuries, illnesses and fatalities in the petroleum industry – as reported to the API – covering US petroleum and petrochemical operations of reporting companies for 1996. Washington DC: American Petroleum Institute

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. LWI Severity	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 .

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

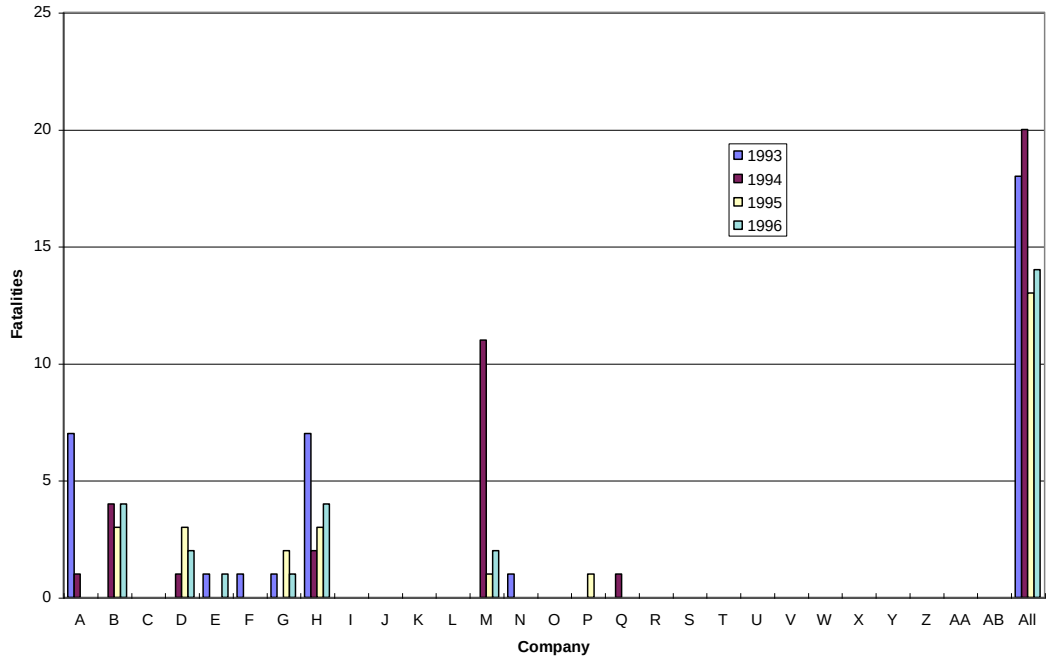


Figure 2 LWIF For Company Employees in European Oil Industry (Both Sectors)

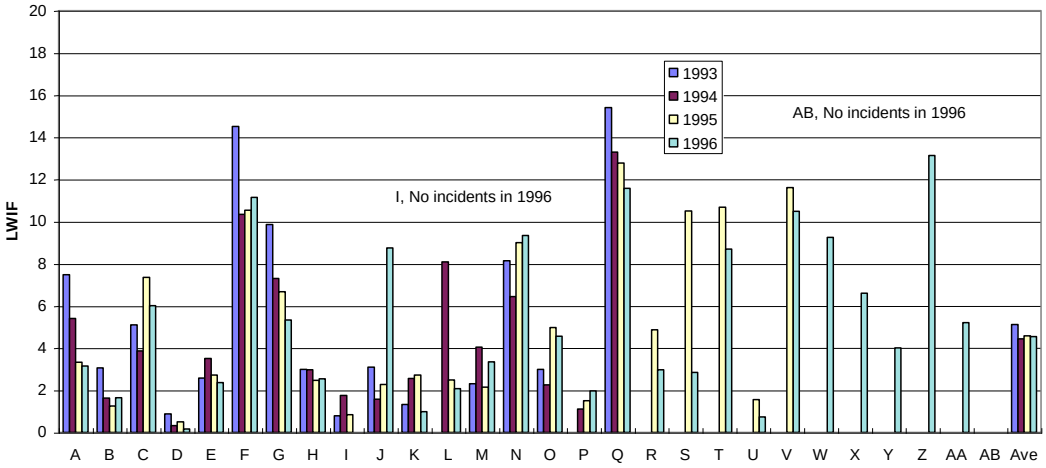


Figure 3 LWIF For Company Employees in European Oil Industry (Manufacturing)

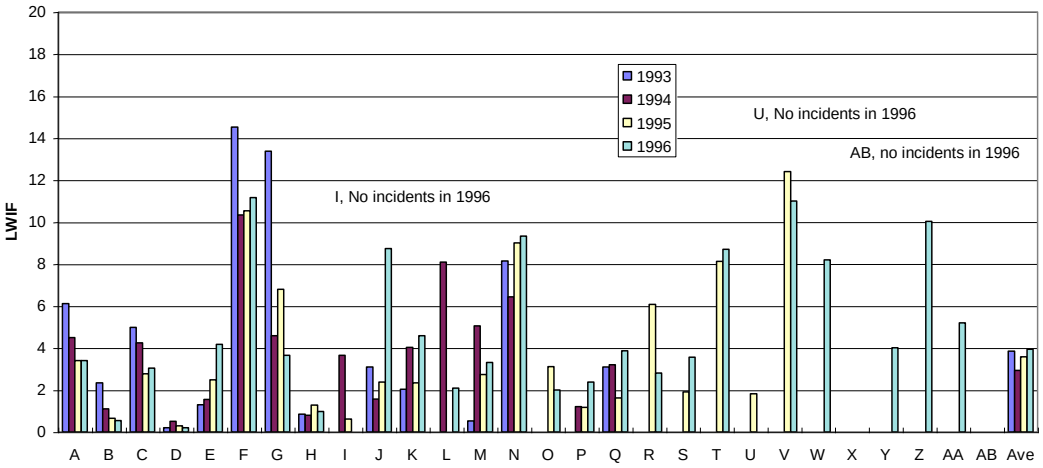


Figure 4 LWIF For Company Employees in European Oil Industry (Marketing)

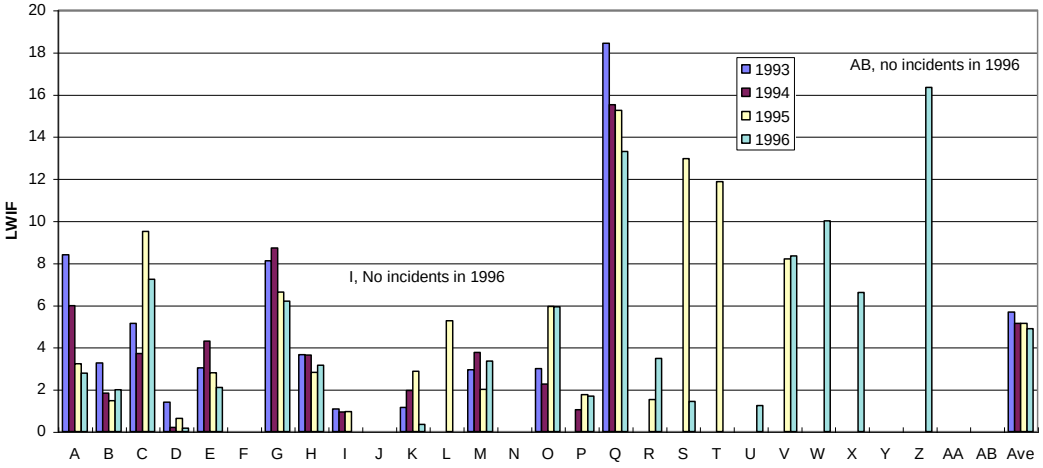


Figure 5 AIF* For Company Employees in European Oil Industry (Both Sectors)

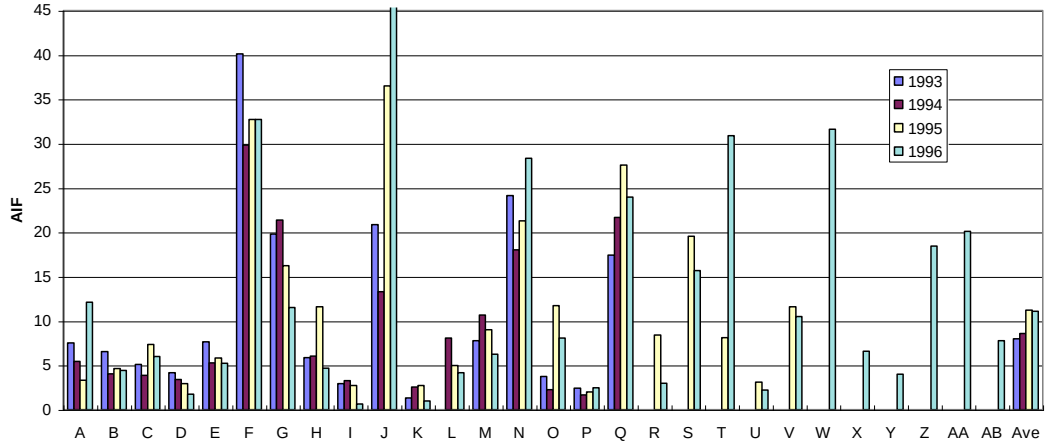


Figure 6 AIF* For Company Employees in European Oil Industry (Manufacturing)

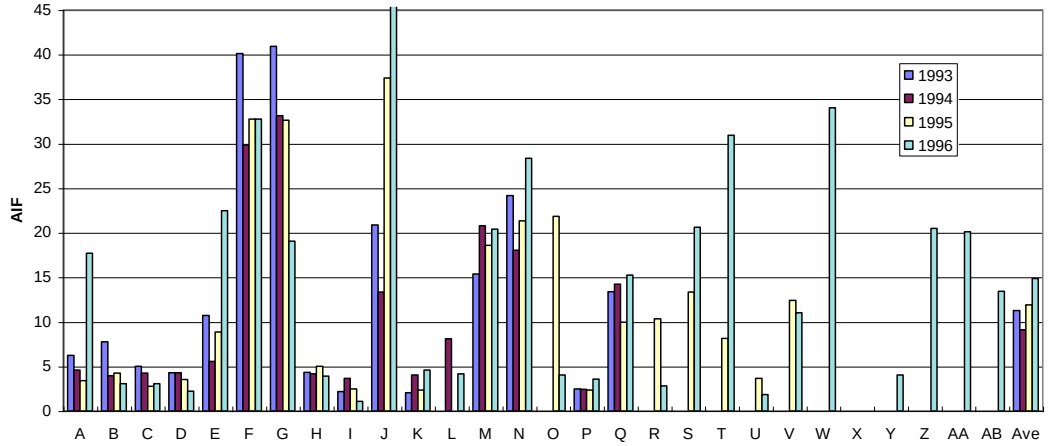
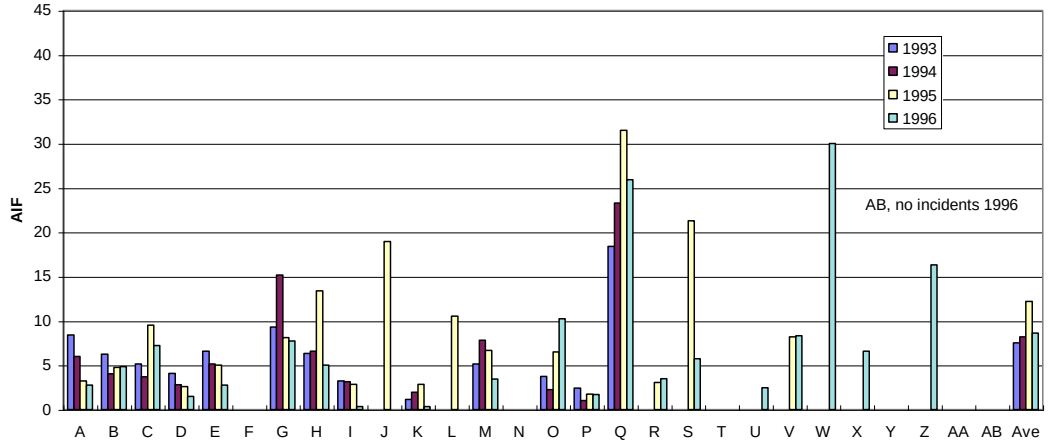


Figure 7 AIF* For Company Employees in European Oil Industry (Marketing)



* 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 8 LWIF For Contractors in European Oil Industry (Both Sectors)

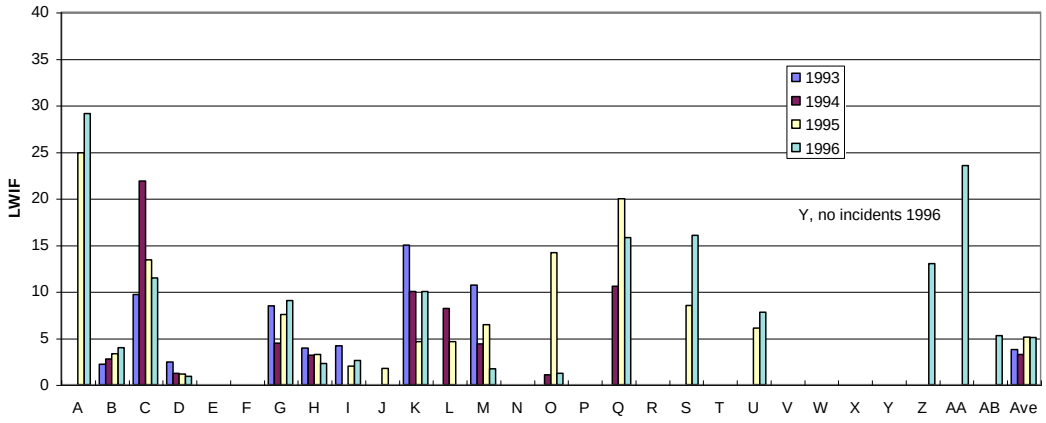


Figure 9 LWIF For Contractors in European Oil Industry (Manufacturing)

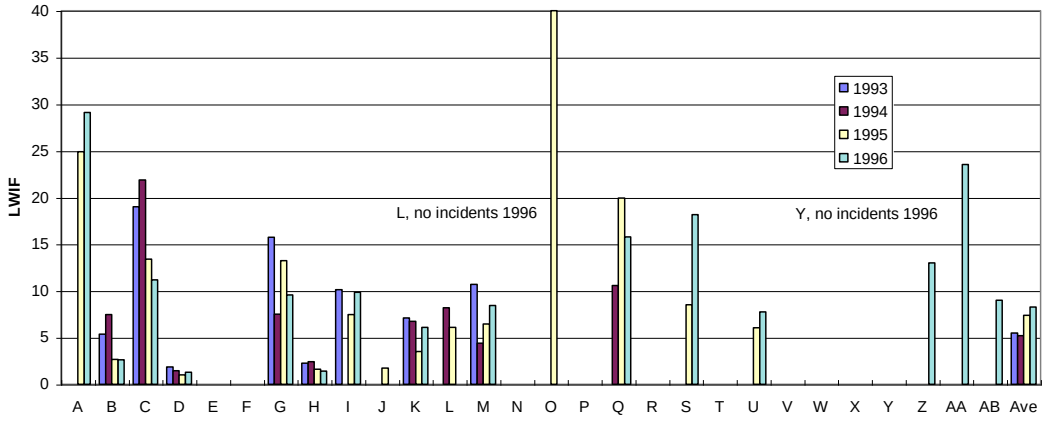


Figure 10 LWIF For Contractors in European Oil Industry (Marketing)

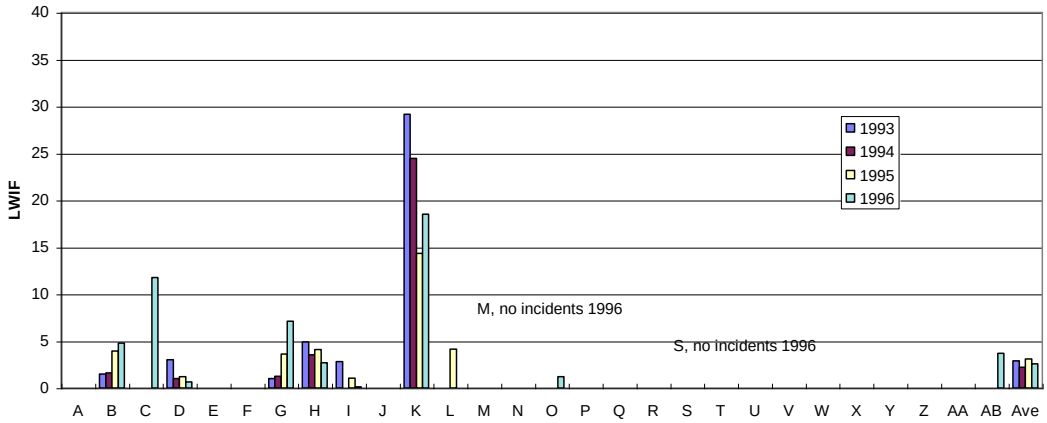


Figure 11 AIF* For Contractors in European Oil Industry (Both Sectors)

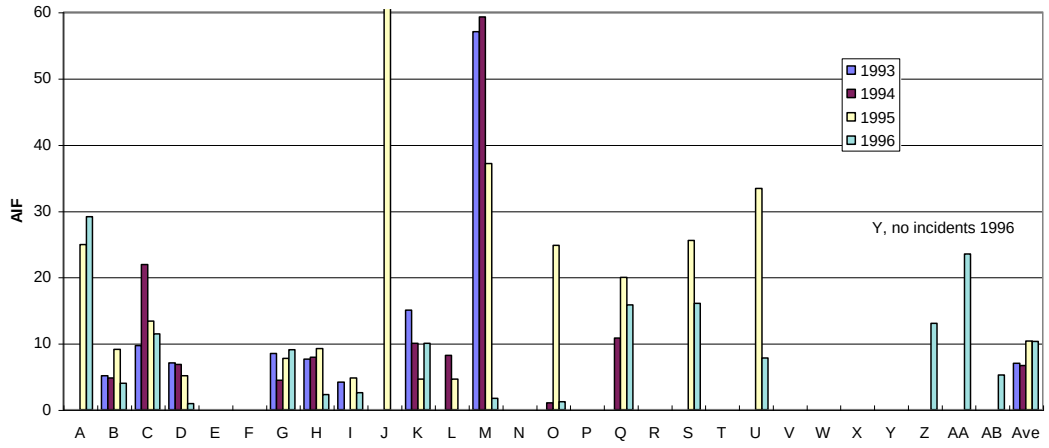


Figure 12 AIF* For Contractors in European Oil Industry (Manufacturing)

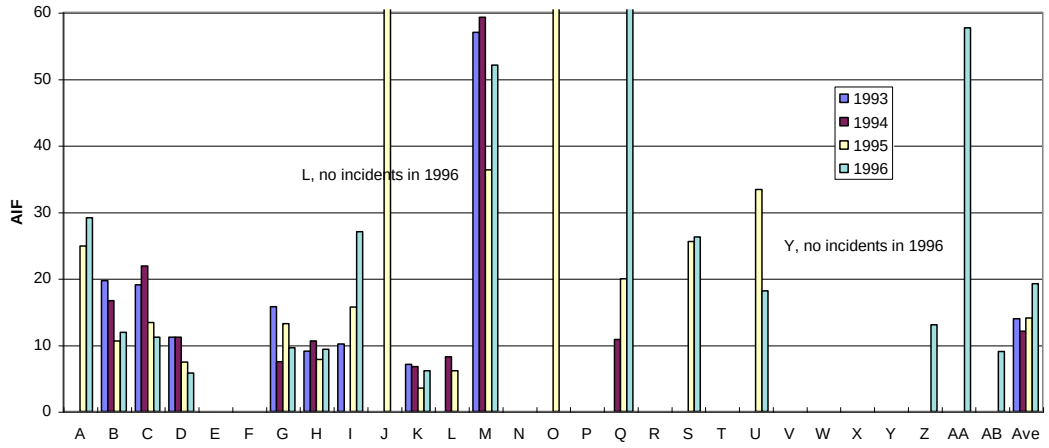
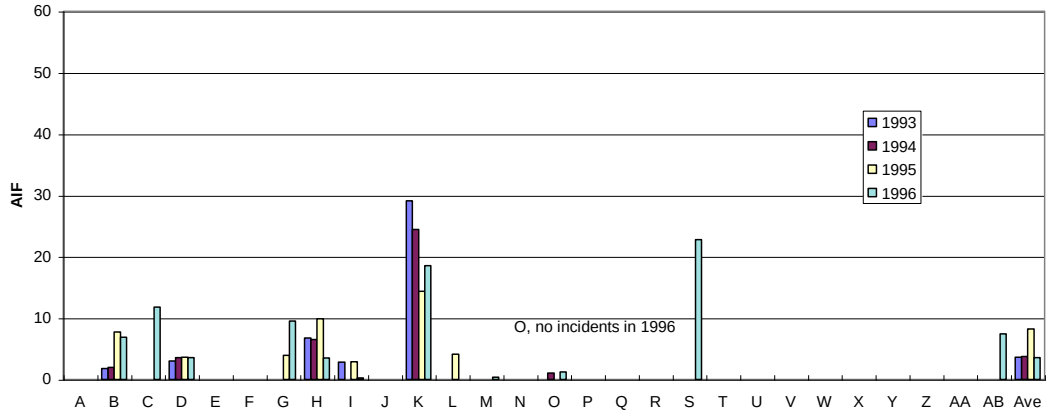


Figure 13 AIF* For Contractors in European Oil Industry (Marketing)



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

(Days Lost per Incident)

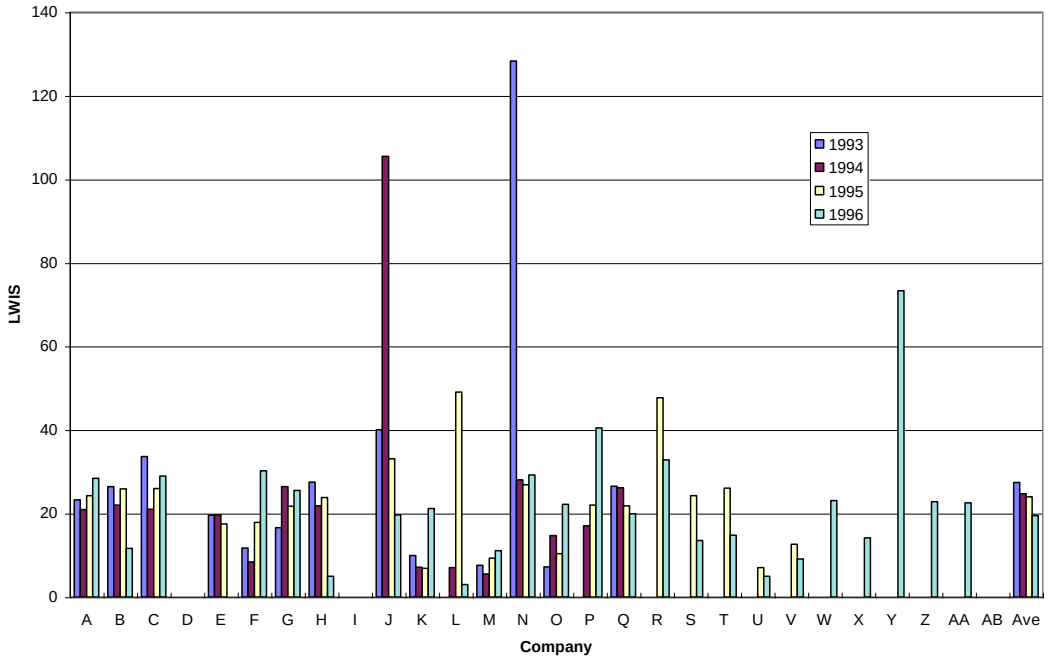
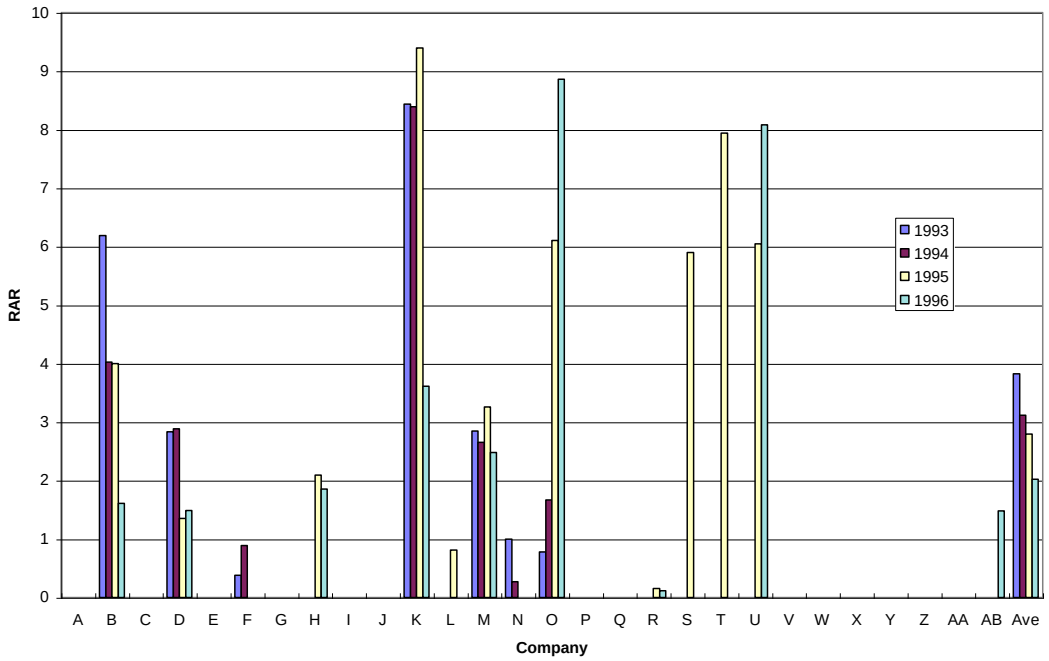


Figure 15 Road Accident Rate

(Accidents per Million Kilometres)



APPENDIX 3 DATA REQUEST FORM

CONCAWE Survey on

European Oil Industry Safety Statistics

Company | Sector: Manufacturing | Year: 1996

		Staff	Contractor
1	Total hours worked		
2	Total number of fatalities		
2a	Road related fatalities		
3	Number of LWIs		
4	Total days lost through LWIs		
5	Number of RWIs		
6	Number of MTCs		
7	AIF		
8	LWIF		
9	LWI Severity (Days/LWI)		
10	Distance travelled (million km)		
11	Number of Road Accidents		
12	Road Accident Rate		