

Downstream oil industry safety statistics

2007 and 2008 reports have been published

The collection and analysis of incident data is an essential element of a modern safety management system, and its importance is recognised throughout the oil industry. CONCAWE has been compiling statistical data for the European downstream oil industry since 1993 and the purpose of this activity is twofold:

- To provide member companies with a benchmark against which to compare their performance, so that they can determine the efficacy of their management systems, identify shortcomings and take corrective action;
- 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.

The reports for the years 2007 and 2008 were published earlier this year (CONCAWE reports 6/09 and 7/09) and are available on CONCAWE's website. Beside the 2007 and 2008 data, the reports also include a full historical perspective from 1993, as well as comparative figures from other industry sectors. Data for these two reports

was submitted by 30 and 31 companies respectively, accounting for more than 90% of the refining capacity of the EU-27 and EFTA member states.

In line with previous reports, the results are reported in the form of key performance indicators that have been adopted by the majority of oil companies operating in Western Europe as well as by other branches of industry. These are: Lost Workday Injury Frequency (LWIF); Lost Work Injury Severity (LWIS); All Injury Frequency (AIF); Road Accident Rate (RAR); and Fatal Accident Rate (FAR). The statistics include companies' own employees as well as contractors, and are split between 'manufacturing' (i.e. mostly refineries) and 'marketing' (i.e. distribution and retail). The results are presented in Table 1 together with all the previous statistics gathered since 1993.

The analytical results are of most interest in the form of historical trends, assisting the safety management efforts for continuous improvement. Figure 1 shows the evolution of the three-year rolling average for the four main indicators over the past 15 years.

Table 1 Historical evolution of the EU downstream oil industry safety performance indicators reported by CONCAWE since 1993

Year	Fatalities	FAR	AIF	LWIF	LWIS	RAR
1993	18	5.0	7.9	4.7	27	18
1994	19	5.4	7.4	4.0	25	19
1995	13	3.5	11.2	4.6	24	13
1996	14	3.3	10.7	4.7	19	14
1997	15	3.4	11.4	4.6	23	15
1998	12	2.6	9.9	4.5	22	12
1999	8	1.8	9.4	4.3	21	8
2000	13	2.7	8.8	4.3	25	13
2001	14	2.8	9.5	4.3	24	14
2002	16	3.3	6.9	3.9	23	16
2003	22	4.1	6.3	3.2	30	22
2004	12	2.3	6.3	3.2	33	12
2005	11	1.9	4.5	2.6	35	11
2006	7	1.5	4.6	2.5	25	7
2007	15	2.8	4.1	1.9	28	15
2008	11	2.0	3.7	1.7	23	11

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These indicator trends show a steady performance over the years with a slow but constant reduction of LWIF, which has now remained below 3.0 for the fourth consecutive year, being further reduced to 1.9 in 2007 and to 1.7 in 2008. This 2008 LWIF value is the lowest ever reported since CONCAWE started gathering these safety statistics. The figures suggest that the AIF peaked around 1995-97, but this is also related to incomplete reporting of this indicator in the early years, as it was not formally in use in all companies. Nevertheless, the trend is definitely on a downward slope and AIF figures have improved for all categories.

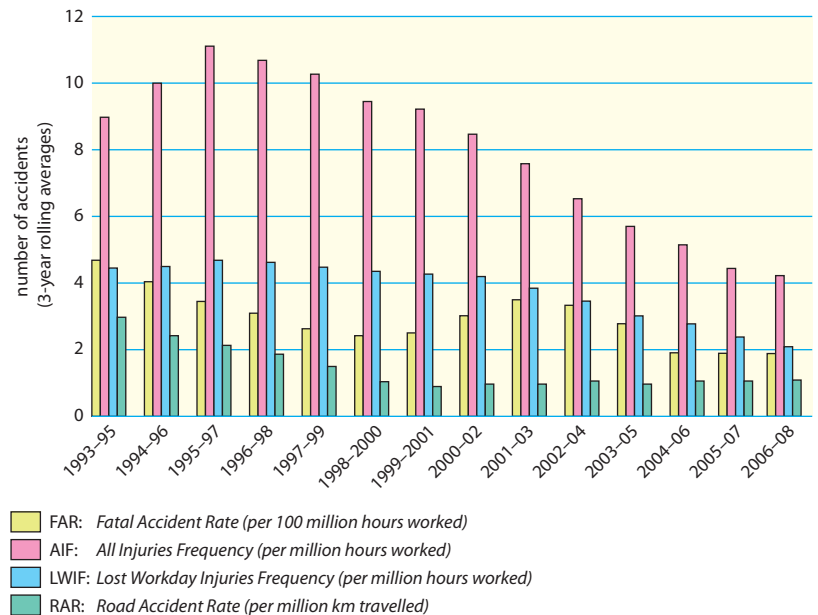
Sadly, a total of 15 fatalities were reported for 2007 and 11 for 2008. These values are higher than for 2006 which, at 7, was the best ever reported. Following a steady downward trend during the 1990s, fatality numbers began to increase in the first years of this decade, peaking in 2003. The reverse in this unfavourable trend since 2004 appears to stabilise, as the three-year rolling average FAR has become stable around 2.0 for the last three years.

Over the last five-year period, road accidents (41%) and incidents during construction/maintenance activities (41%) remain the principal causes of fatalities. Calculated over the complete period that CONCAWE has been gathering these statistics, such incidents represent 46% and 34% respectively of the total fatality numbers. The third major cause of incidents resulting in fatalities appears to be burns, explosions and electrocution (12%).

Figure 2 shows the relationships between the AIF, LWIF and FAR. The blue line shows a very stable relationship between AIF and LWIF indicating that nearly half of all incidents lead to a LWI. Because of the inherent high variability of FAR, the other two ratios appear less stable but still indicate roughly a fatality for every 100 LWI. This suggests that the classic 'safety pyramid' with an order of magnitude difference between AI, LWI and FAR, appears not to be applicable to our industry.

Despite the positive trends in LWIF and AIF, the severity indicator LWIS, that expresses the average number of days lost per LWI, does not show the same continuously decreasing trend (Figure 3).

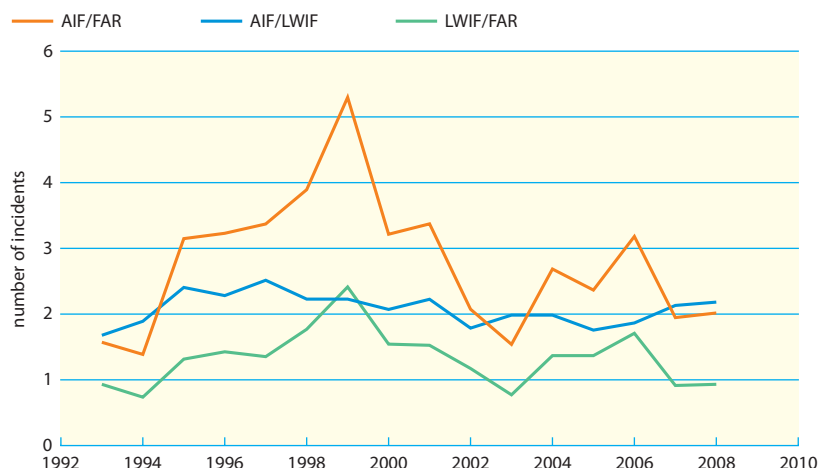
Figure 1 Three-year rolling average personal incident statistics relating to the European downstream oil industry



Together with the observed increase in the number of fatalities, this may be indicative that although the overall safety performance in the downstream oil industry is still improving with respect to the frequency of incidents and their absolute number, there is little change in the overall impact of those incidents which do occur.

This has triggered a discussion in CONCAWE about whether the performance indicators currently in use are sufficient, or if the set should be extended. CONCAWE

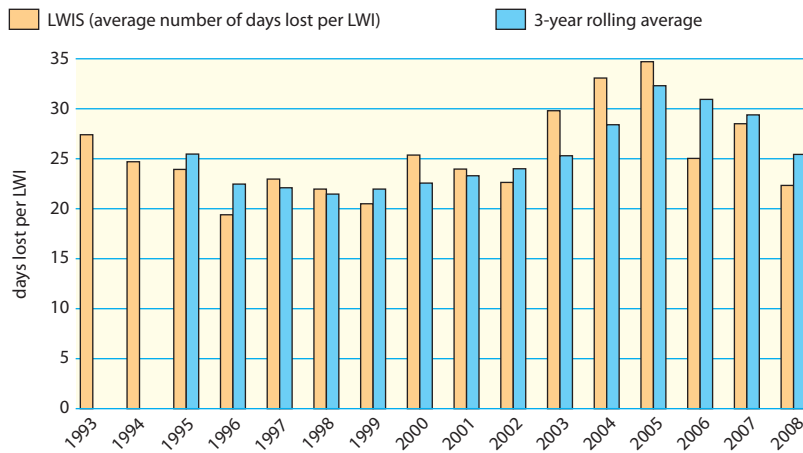
Figure 2 Incident and fatalities frequencies relationships for the European downstream oil industry



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Figure 3 Lost Work Injury Severity (LWIS) from 1993–2008 and the three-year rolling average in the European downstream oil industry



This indicator is already in use by many member companies and will enable a comparison on a regional scale within our Industry.

CONCAWE will request its members to initiate the gathering of information on this PSPI as of 2010 to gain initial experience, and aspires to include this process safety indicator in future safety performance reporting.

experts are of the opinion that the observations described above justify gaining a better insight into the nature of the incidents which continue to occur. Many companies now routinely monitor indicators related to process safety, which may be one major factor.

In recognition of this trend, CONCAWE is planning to add a Process Safety Performance Indicator (PSPI) to the existing set of key performance indicators it monitors. The selected PSPI will be the lagging indicator defined by the American Petroleum Institute (API) in their report *API Guide to Report Process Safety Incidents*¹. This defines a reportable process safety incident as:

Loss of Primary Containment (LOPC), which occurs on a Company wholly-owned or operated facility and which results in one or more of the following:

- a. A Fatality or Days Away From Work Incident;
- b. A fire or explosion;
- c. An acute release of flammable or combustible liquid, gas or vapour; or
- d. An acute release of a toxic chemical.

¹ http://www.api.org/ebs/health/upload/API_Guide_to_PSI_FINAL_12_20.pdf