



# Downstream oil industry safety statistics

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**The 2009 safety statistics report focuses on personal injuries and process safety incidents for the European refining industry.**  
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The importance of a modern and effective safety management system is widely recognised by the oil industry. Because the collection and analysis of incident data are essential elements of these systems, CONCAWE has been compiling statistical safety data for the European downstream oil industry since 1993. The purpose of this activity is twofold:

1. To provide CONCAWE's member companies with a benchmark against which to compare their own performance; this provides information against which they can evaluate the efficacy of their management systems, identify shortcomings and take corrective action.
2. To demonstrate that the responsible management of safety in the downstream oil industry results in a lower level of accidents, despite the hazards intrinsic to its operations.

The 2009 annual safety report was published in 2010 (CONCAWE report 7/10) and is available on CONCAWE's website. In addition to the 2009 results, the report also includes a full historical perspective from 1993, as well as comparative figures from other industry sectors. Data were submitted by 33 CONCAWE member companies, accounting for more than 97% of the refining capacity of the EU-27 and European Free Trade Association Member States.

In line with previous reports, the safety 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 indicators are:

- Number of fatalities;
- Fatal Accident Rate (FAR) per 100 million hours worked;
- All Injury Frequency (AIF);
- Lost Workday Injury Frequency (LWIF);
- Lost Workday Injury Severity (LWIS); and
- Road Accident Rate (RAR) per million km travelled.

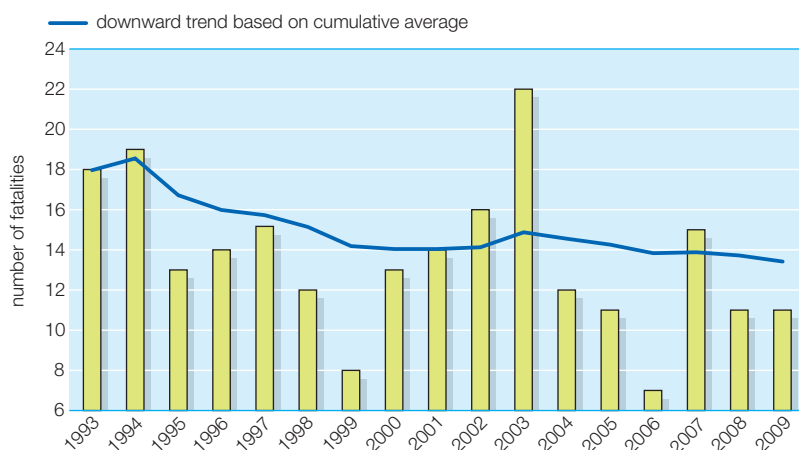
The statistics relate to companies' own employees, as well as to contractors, and are split between 'manufacturing' (i.e. mostly refineries) and 'marketing' (i.e. distribution and retail). The performance indicator results are of greatest interest in the form of historical trends because they provide guidance to safety management efforts for continuous improvement. Figure 1, for example, shows the declining trend in the number of fatalities while Figure 2 shows the evolution of the three-year rolling average for the four main indicators, FAR, AIF, LWIF and RAR.

These indicator trends show a steady performance improvement over the past 16 years with a slow but constant reduction of LWIF, which has remained below 3.0 for the fifth consecutive year. The figures suggest that AIF peaked around 1996–97 but this could be due to incomplete AIF reporting in the early years when this indicator was not formally used in all companies. The trend is definitely on a downward slope, however, and AIF figures have improved for all categories.

Regrettably, 11 fatalities were again reported in 2009. This number is higher than the 2006 result, which was the best over the 16 year period. Following a steady downward trend in the 1990s, fatality numbers began to increase in the first years of the last decade, peaking in 2003. This unfavourable trend appears to have stabilised since 2004, with the three-year rolling average for FAR remaining at around two for the past three years.

Of the 2009 fatalities, three were due to road accidents, three were due to one confined space entry incident, and two were caused by falls from height. For the remaining three fatalities, one resulted from hazards directly associated with maintenance and construction activities, one was caused by burning/electrocution, and one was classified as the result of other industrial activities.

**Figure 1 Number of reported fatalities since 1993**





The principal causes of fatalities over the past five-year period continue to be road accidents (~40%) and incidents during construction/maintenance activities (~45%). For the entire period over which CONCAWE has been gathering these statistics, these two causes of fatalities have contributed 45% and 35% respectively. The third major cause of fatalities (12%) is 'burns, explosions and electrocution'.

The relationship between the AIF, LWIF and FAR is presented in Figure 3. Although the number of fatalities per year biased the curves associated with the FAR values, the figure does show relatively stable relationships among these indicators over time. Almost half of incidents are Lost Workday Injuries (LWIs) and, regrettably, there was approximately one fatality for every 100 LWIs.

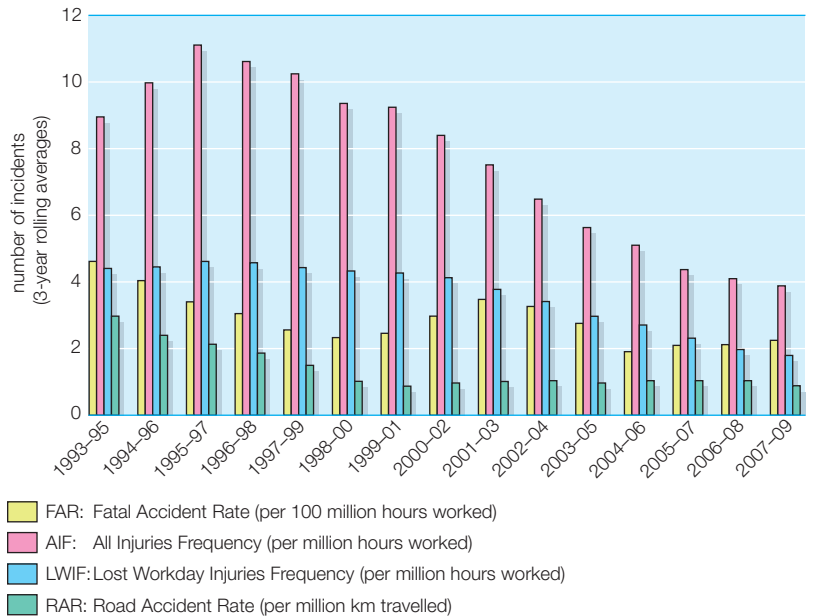
In spite of the positive trends in LWIF and AIF, the LWIS severity indicator, that expresses the average number of days lost per LWI, increased in 2009. The LWIS results and the three-year rolling average are presented in Figure 4. Although the LWIS results declined after the peak in 2005, the three-year rolling average of this severity indicator still remains above the all-time LWIS average of 25.

When combined with the apparent stability in the number of fatalities, the LWIS results may indicate that the nature and impact of incidents is not decreasing similarly. Hence, although the overall safety performance in the industry is improving with respect to incident frequencies and absolute number of incidents (see also the 2007 and 2008 reports), there is little improvement in the impact of incidents that do occur.

This observation has triggered a discussion within CONCAWE's safety group as to whether the performance indicators that are currently used are sufficient or whether they should be extended. CONCAWE experts have concluded that the observations described above warrant a closer look into the types and causes of the incidents that continue to occur. For example, many companies now routinely monitor performance indicators related to process safety, which may be one major factor.

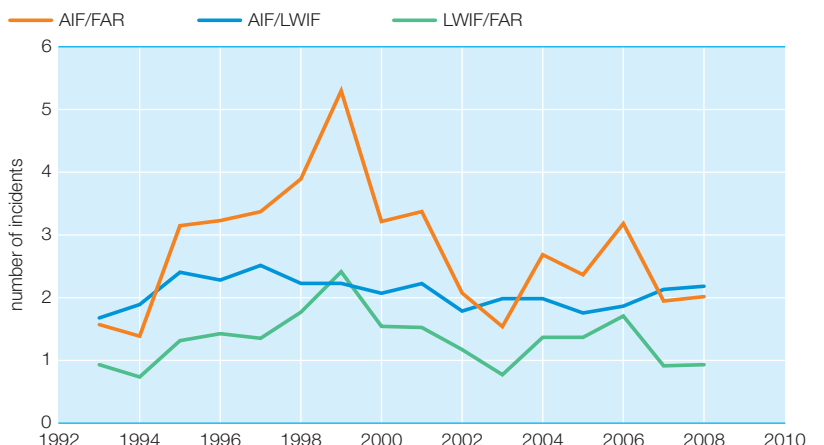
In recognition of this trend, CONCAWE, starting in 2010, decided to extend the key performance indicators that it

**Figure 2 Three-year rolling averages for personal incident statistics relating to the European downstream oil industry**



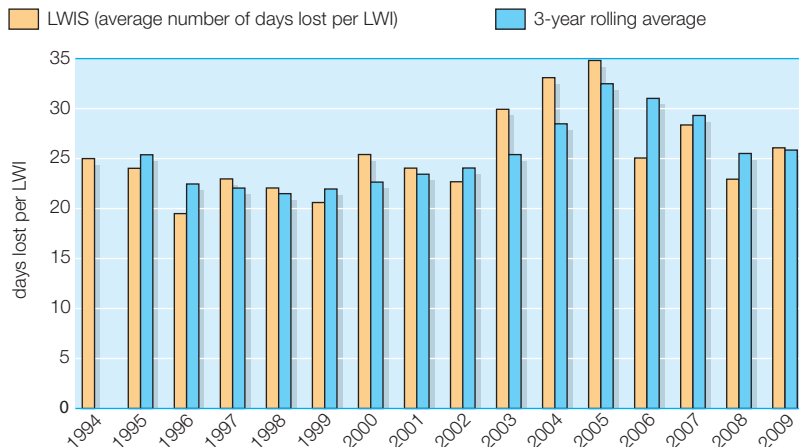
monitors by adding a Process Safety Performance Indicator (PSPI). The selected PSPI incorporates the lagging Tier 1 and Tier 2 reporting elements (i.e. loss of primary containment events of greater and lesser consequence, respectively). These have been defined by the American Petroleum Institute (API) in the ANSI/API Recommended Practice 754, *Process Safety Performance Indicators for the Refining and Petrochemical Industries* ([www.api.org/Standards/new/api-rp-754.cfm](http://www.api.org/Standards/new/api-rp-754.cfm)).

**Figure 3 Incident and fatalities frequencies relationships for the European downstream oil industry**





**Figure 4 Lost Workday Injury Severity (LWIS) from 1994–2009 and the three-year rolling average in the European downstream oil industry**



**Table 1 Results of the 2009 PSPI data gathering**

	Manufacturing	Marketing	Both sectors
<b>Companies</b>			
Total	33	33	33
Process safety reporting	18	7	7
% reporting	55%	21%	21%
<b>Hours worked (Mh)</b>			
Totals	242.4	303.1	545.5
Process safety reporting	143.8 (99.8) <sup>a</sup>	50.2	194
% reporting	59% (41%) <sup>a</sup>	17%	36%
<b>Tier 1 PSE: No. of PSEs</b>	156	22	178
<b>Tier 2 PSE: No. of PSEs</b>	430	196	626
<b>Tier 1 PSER: PSE/Mh reported</b>	1.09	0.44	0.92
<b>Tier 2 PSER: PSE/Mh reported</b>	4.31	3.90	3.23
<b>Total PSER: PSE/Mh reported</b>	4.08	4.34	4.14

<sup>a</sup> Figures in brackets are the hours reported by the companies that provided Tier 2 Process Safety Events (PSEs)

The PSPI indicator was selected because it was considered to be applicable to our industry and is already in use by many member companies. Furthermore, it will enable a comparison on a regional scale within our industry. CONCAWE has therefore requested that all member companies begin gathering PSPI information in 2010. To gain preliminary insight into this PSPI reporting, the 2009 safety performance questionnaire was also extended with a request for PSPI data; 18 member companies responded by providing these data in their annual report for analysis. The results of the PSPI data gathering in 2009 are provided in Table 1.

In Figure 5, the cumulative frequency for the Process Safety Event Rate (PSER) is shown for manufacturing sites only where the PSER data were considered to be sufficiently robust to warrant such an analysis. These first results are encouraging because they show that Process Safety Management is already well integrated into our industry's procedures and that companies are ready to share their PSPI data with CONCAWE.

CONCAWE expects that more member companies will provide this information in the coming years. It will then be possible to develop a robust PSPI database for performance reporting and trend analysis for the European refining and distribution industry. This is expected to provide data that can be used to support the positive evolution of responsible safety management in the oil industry, including Process Safety.

**Figure 5 Cumulative frequency for manufacturing PSER**

