



# Downstream oil industry safety statistics for 2015

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**The 2015 safety statistics report presents data on personal injuries and process safety, highlighting trends over the past 22 years of data collection.**  
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Safety management systems are widely recognised by the oil industry as an essential tool for collecting and analysing safety incident data, and for continuously improving the safety of employees and contractors. To support this effort, Concawe has, since 1993, been compiling statistical safety data for the European downstream oil industry to:

- provide member companies with a benchmark against which to compare their own company's safety performance; and
- demonstrate how responsible approaches to safety management can help to ensure that accidents stay at low levels in spite of the hazards that are intrinsic to refinery and distribution operations.

Most importantly, Concawe's annual safety data report enables companies to evaluate the efficacy of their own management systems, identify any shortcomings, and take corrective actions as quickly as possible.

## What safety data do we evaluate?

Concawe's 22nd report on our industry's safety performance (Concawe Report 12/16) presents statistics on work-related personal injuries sustained by oil industry employees and contractors during 2015. It also highlights trends over the past 22 years of data collection and compares the oil industry's performance to that of other industrial sectors.

The 2015 report compiles safety data submitted by 38 Concawe member companies, representing about 97% of the refining capacity of the EU-28 plus Norway and Switzerland. The statistics are reported primarily in the form of key performance indicators adopted by the majority of oil companies operating in Europe, as well as by other types of manufacturing industries. These indicators are:

- Number of work-related fatalities;
- Fatal Accident Rate (FAR), expressed as the number of fatalities per 100 million hours worked;
- All Injury Frequency (AIF) expressed as the number of injuries per million hours worked;
- Lost Workday Injuries (LWIs) and the Lost Workday Injury Frequency (LWIF) calculated by dividing the number of LWIs by the number of hours worked in millions;

- Lost Work Injury Severity (LWIS), the average number of lost workdays per LWI;
- Road Accident Rate (RAR), the number of road accidents per million km travelled; and
- Process Safety Performance Indicators (PSPIs) that report the number of Process Safety Events (PSEs) expressed as unintended Losses of Primary Containment (LOPCs).

## Process Safety Performance Indicators

Several major industrial incidents, including the Toulouse explosion (2001), the Buncefield fire (2005) and the Texas refinery explosion (2005), have led to increased attention being given to the causation of such events. This has led to several initiatives that focus on the gathering of PSPIs. The lagging indicator for this is the PSEs, mainly Losses of Primary Containment, because these have been proven to be the initiating events for the aforementioned disasters.

PSPI data were collected in 2015 for the seventh consecutive year, following the publication of the latest recommended practice of the American Petroleum Institute. The additional data provide insights into the types and causes of process safety incidents. PSPIs also enable the refining and distribution industry to compare their European process safety performance with similar data from other regions of the world.

Thirty Concawe companies provided PSPI data in 2015. From these responses, a Process Safety Event Rate (PSER) indicator of 1.5 was recorded for all PSEs, which is the lowest result ever. The overall results of the PSPI survey are presented in Table 1 on page 15. Fortunately, none of the reported PSEs resulted in a major incident that the understanding of PSE causation is trying to prevent.

Since the PSI data gathering was started in 2009, there has been a gradual decrease in the PSER, irrespective of the number of reporting Companies, as can be seen in Figure 1 on page 15. This decreasing trend is a good example of the commitment of the Concawe membership to process safety management, and furthermore demonstrates that the systematic gathering of such data enables the membership to actively manage this operational threat.

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### Personal Safety Indicators

Accident frequencies in the European downstream oil industry have been historically quite low; the 2015 data show a 1.0 LWIF for 2015, which is the lowest value ever reported in the sector.

In general, performance indicator results are of greatest interest when these can be analysed for historical trends. The evolution of safety performance over a period of time provides indications on how well safety management efforts are working. Figure 2, for example, shows the changes and improving trends in the three-year rolling averages for the four main performance indicators mentioned above.

The trends in these indicators show a steady performance improvement over the past 22 years, with a slow but constant reduction in LWIF which remained below 2.0 for the seventh consecutive year. Although the data suggest that AIF peaked around 1996–97, this could also result from better data reporting as the AIF indicator was not formally used in all companies in the early years of Concawe’s data gathering. Since 1997, the trend in AIF has generally been downwards except for a slight increase in 2010.

Regrettably, seven fatalities in four separate incidents were reported in 2015. Two of these fatalities were due to road accidents, four were due to a single explosion incident and one was caused when a worker was caught by a moving object. The explosion occurred during a shut-down on a manufacturing site. The two road fatalities occurred in the marketing sector.

The seven fatalities in 2015 are among the lowest numbers of annual fatalities experienced since Concawe started to collect safety data (see Figure 3 on page 16). After a steady downward trend during the 1990s, fatalities began to increase again in 2000 with a very high value of 22 fatalities in 2003. This unfavourable trend was reversed in 2004–06 and the fatality numbers have shown little variation since that time. The three-year rolling average for FAR has also stayed at about 2 for the past six years.

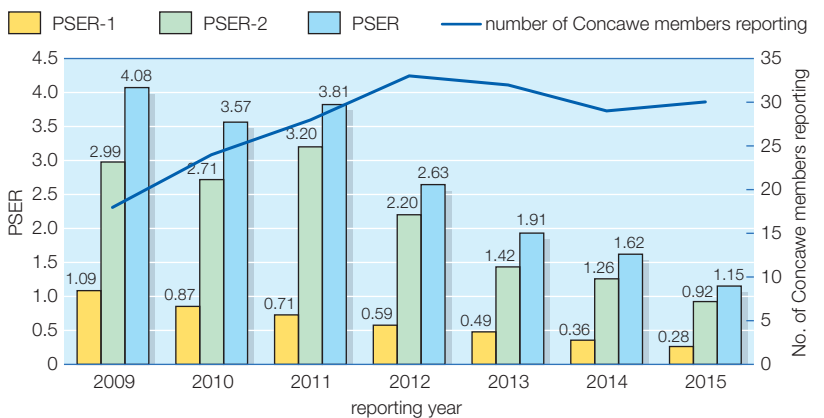
The relationships between the AIF, LWIF and FAR are presented in Figure 4 on page 16.

**Table 1 Results of the 2015 PSPI survey**

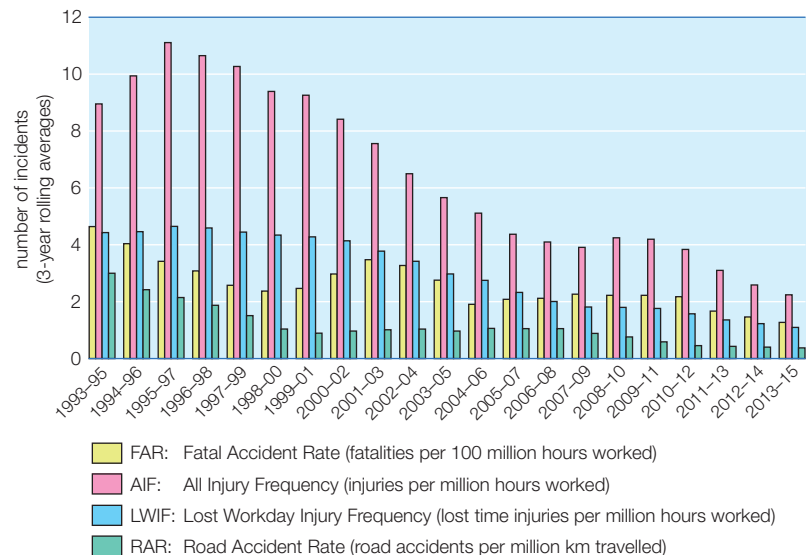
	Manufacturing	Marketing	Both sectors
<b>Companies reporting</b>			
Total	35	22	21
Process safety reporting	30	17	16
Percentage	86%	77%	76%
<b>Hours worked (Mh)</b>			
Total	266.4	291.2	557.6
Process safety reporting	249.9 (236.0) <sup>a</sup>	248.1	497.9 (484.0) <sup>a</sup>
Percentage	96%	85%	89%
<b>Tier 1 PSE: PSE</b>	70	25	95
<b>Tier 2 PSE: PSE</b>	217	82	299
<b>Tier 1 PSER: PSE/Mh reported</b>	0.28	0.10	0.19
<b>Tier 2 PSER: PSE/Mh reported</b>	0.92	0.33	0.62
<b>Total PSER: PSE/Mh reported</b>	1.15	0.43	0.79

<sup>a</sup> The values in parentheses show the hours reported by companies that provided Tier-2 PSE data.

**Figure 1 PSER data for manufacturing, 2009–2015**

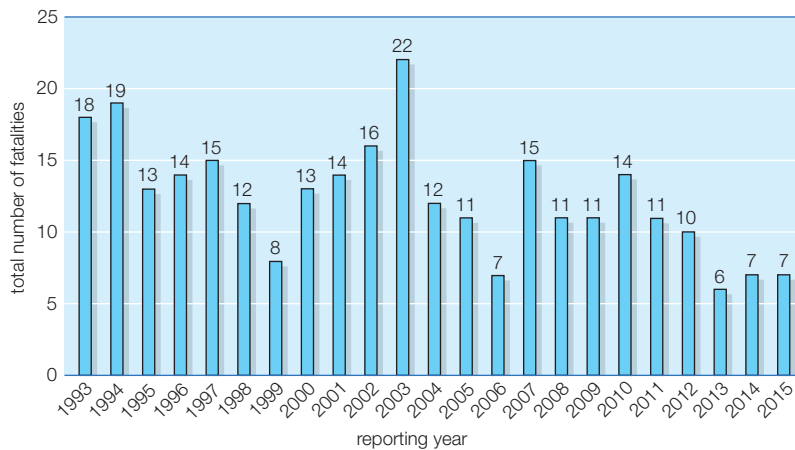


**Figure 2 Three-year rolling average personal incident statistics for the European downstream oil industry**

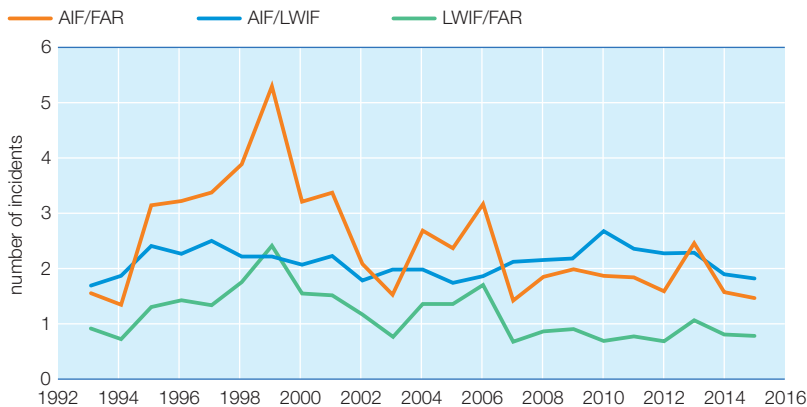




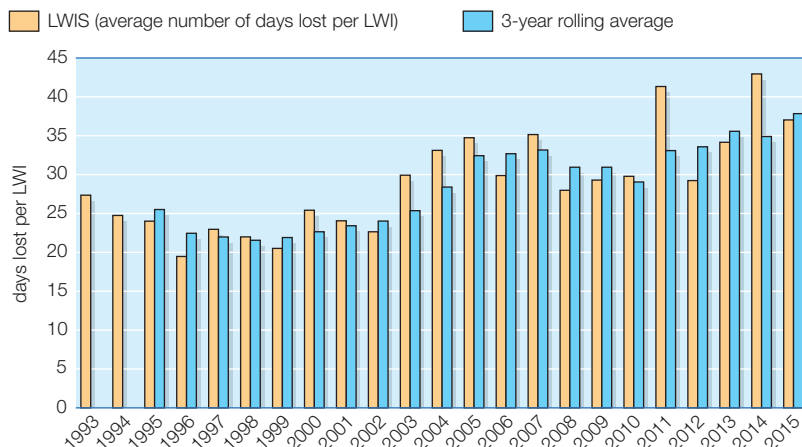
**Figure 3 Numbers of reported fatalities since 1993**



**Figure 4 Relationships between incidents and fatalities for the European downstream oil industry**



**Figure 5 Lost Workday Injury Severity (LWIS) from 1993–2015 and the three-year rolling average for the European downstream oil industry**



While the number of fatalities per year has an impact on the two curves that are associated with FAR values, the figure shows relatively stable relationships among these indicators over time. Almost half of safety incidents are LWIs and there was approximately one fatality for every 100 LWIs.

Contrary to the positive trends in the LWIF and AIF indicators, the LWIS indicator, expressing the average number of days lost per LWI, increased in 2015. LWIS data and the three-year rolling average are shown in Figure 5. Although the LWIS results declined after peaking in 2010, the three-year rolling average still remains above the all-time LWIS average of 25. Therefore, the severity of the incidents that occur remains a concern.

### Causes of LWIs

In the 2015 survey, Concawe also gathered information on the causes of Lost Work Injuries (LWIs) to see how closely the LWIs could be related to the causes of fatalities. In 2015 the LWIs were categorised in five main categories also used to report the causes of the fatalities. These five categories were selected after ample analysis of the reporting method for this kind of data by other industrial sectors and the current practice within the Concawe membership. The result is a scheme that is very closely related to that of the International Association of Oil & Gas Producers (IOGP), an association comprising many Concawe members and performing scientific advocacy on behalf of their Exploration and Production activities.

A total of 546 LWIs were reported in 2015 of which 537 (98%) were assigned to one of the 5 agreed categories by the reporting member companies. An overview of the LWI incidents and causes are provided in Table 2 on page 17. The trend in LWIs has decreased gradually, from 643 in 2013 to 546 in 2015.

When looking over the longer period since in 2007, the total number of LWIs has decreased by more than 45% from a total of 1029. Taking into account the increased number of Member Companies reporting their safety statistics and the fact that the number of reported working hours has hardly altered, this shows that seri-



**Table 2 LWIs and their causes**

2015						2014	2013
Cause		Manufacturing	Marketing	Combined	Percentage	Percentage	Percentage
<b>Road accident</b>	Road accidents	7	16	23	4.2%	3.9%	4.4%
<b>Height/falls</b>	Falls from height	21	26	47	8.6%	8.6%	10.3%
	Staff hit by falling objects	7	10	17	3.1%	4.6%	3.6%
	Slips and trips (same height)	79	82	161	29.5%	27.1%	32.7%
<b>Burn/electrical</b>	Explosion or burns	27	6	33	6.0%	6.2%	4.8%
	Exposure (electrical)	4	0	4	0.7%	0.5%	0.6%
<b>Confined space</b>	Confined space	1	0	1	0.2%	0.2%	0.8%
<b>Other causes</b>	Assault or violent act	2	15	17	3.1%	2.8%	1.7%
	Water-related, drowning	0	0	0	0.0%	0.0%	0.2%
	Cut, puncture, scrape	11	14	25	4.6%	8.6%	5.0%
	Struck by	28	37	65	11.9%	10.9%	9.6%
	Exposure, noise, chemical, biological, vibration	11	3	14	2.6%	2.5%	2.6%
	Caught in, under or between	31	18	49	9.0%	7.7%	7.3%
	Overexertion, strain	43	33	76	13.9%	10.0%	12.4%
	Pressure release	4	0	4	0.7%	0.9%	0.9%
	Other	5	5	10	1.8%	5.6%	3.1%
<b>Total</b>		<b>281</b>	<b>265</b>	<b>546</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

ous improvements in personal safety management have been achieved.

In addition, when further analysing the data, it can be concluded that the improvement in the personal safety performance of contractor staff is catching up with that of the sector's own staff, while the LWIF and AIF (Figure 6) performance actually appears to be better for contractor staff. It can be concluded, therefore, that the sector is finding the balance between managing the safety performance of both contractor and own staff. However, further performance improvements for both groups remains a feasible target.

**Figure 6 Historical evolution of All Injury Frequency (AIF), segmented 3-year rolling average**

