



Downstream oil industry safety statistics for 2013

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The 2013 safety statistics report presents data on personal injuries and process safety, highlighting trends over the past 20 years of data collection.
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Safety management systems are widely recognized by the oil industry as an essential tool for collecting and analysing safety incident data and 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 in order to:

1. provide member companies with a benchmark against which to compare their own company's safety performance; and
2. 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 20th report on the European downstream oil industry's safety performance (Concawe Report 8/14) presents statistics on work-related personal injuries sustained by oil industry employees and contractors during 2013. It also highlights trends over the past 20 years of data collection and compares the oil industry's performance to that of other industrial sectors.

The 2013 report compiles safety data submitted by 34 Concawe member companies, representing about 93% 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 (LWI) and the Lost Workday Injury Frequency (LWIF) calculated by dividing the LWI 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 2013 for the fifth consecutive year, following the publication of the latest recommended practice of the American Petroleum Institute (API). 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-two Concawe companies provided PSPi data in 2013. From these responses, a Process Safety Event Rate (PSER) indicator of 1.7 was recorded for all PSEs, which is the lowest result ever. The overall results of the PSPi survey are presented in Table 1 (overleaf).



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Table 1 Results of the 2013 PSPI survey

Sector	Manufacturing	Marketing	Both sectors
Companies reporting			
Total	39	23	22
Process safety reporting	32	13	13
Percentage	82%	57%	59%
Hours worked (Mh)			
Total	281	292.5	573.5
Process safety reporting	268.2 ^a	223.1	457.7
Percentage	95% ^a	76%	86%
Tier 1 PSE: PSE	115	9	124
Tier 2 PSE: PSE	334	81	415
Tier 1 PSER: PSE/Mh reported	0.43	0.04	0.27
Tier 2 PSER: PSE/Mh reported	1.25	0.36	1.34
Total PSER: PSE/Mh reported	1.67	0.40	1.18

^a All companies provided both Tier 1 and Tier 2 PSEs for 2013.

Figure 1 PSE data for manufacturing, 2009–2013

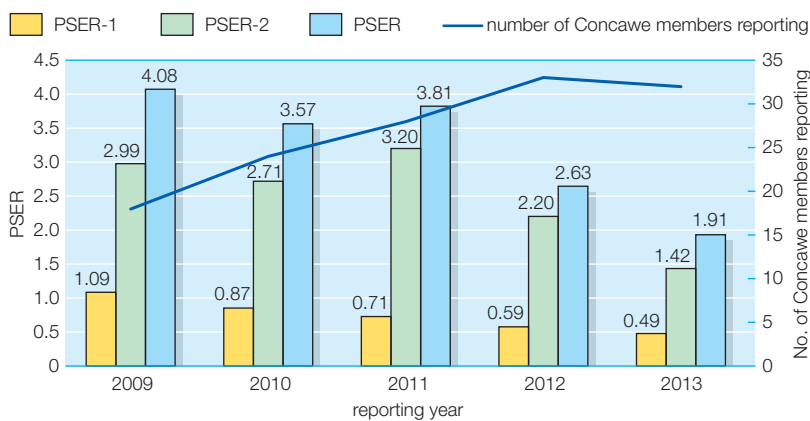
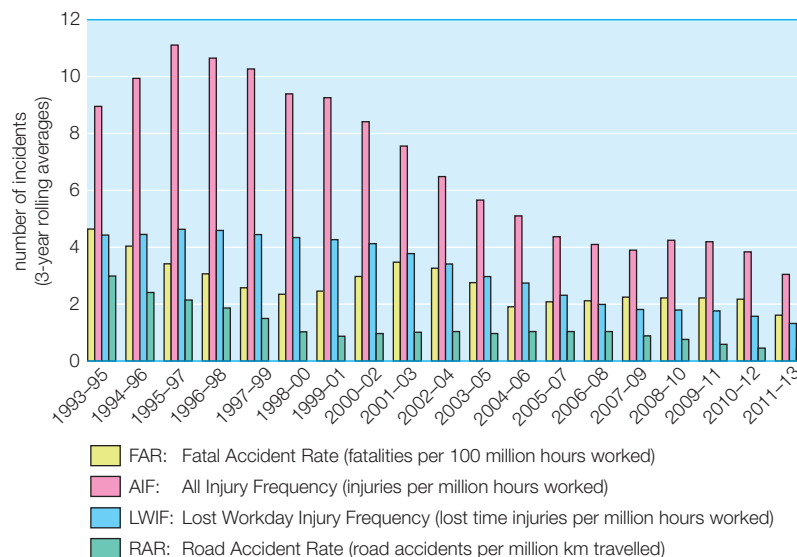


Figure 2 Three-year rolling average personal incident statistics for the European downstream oil industry



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. 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.

Personal Safety Indicators

Accident frequencies in the European downstream oil industry have been historically quite low; the 2013 data shows a 1.1 LWIF for 2013, 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 20 years, with a slow but constant reduction in LWIF which remained below 2.0 for the fifth 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, six fatalities in five separate incidents were reported in 2013:

- one of these fatalities was due to a road accident;
- three were due to two pressure release incidents;
- one was caused by a worker caught in, under or between a moving mass; and
- one was caused by a fall.



The six fatalities in 2013 are again the lowest ever experienced since Concawe started to collect safety data (Figure 3). 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 four years.

In 2013, contractors in the manufacturing sector of the European oil industry were the most vulnerable work group, experiencing four fatalities. This clearly remains a concern and demonstrates that all companies should ensure that their contractor workforce is fully integrated into their safety awareness and monitoring systems.

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

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 2013. 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 fatalities and LWIs

In the 2013 survey, Concawe also gathered information on the causes of Lost Work Injuries in order to see how closely the LWIs could be related to the causes of fatalities. In 2013 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 of the previous practice within the Concawe membership. The result is a scheme

Figure 3 Numbers of reported fatalities since 1993

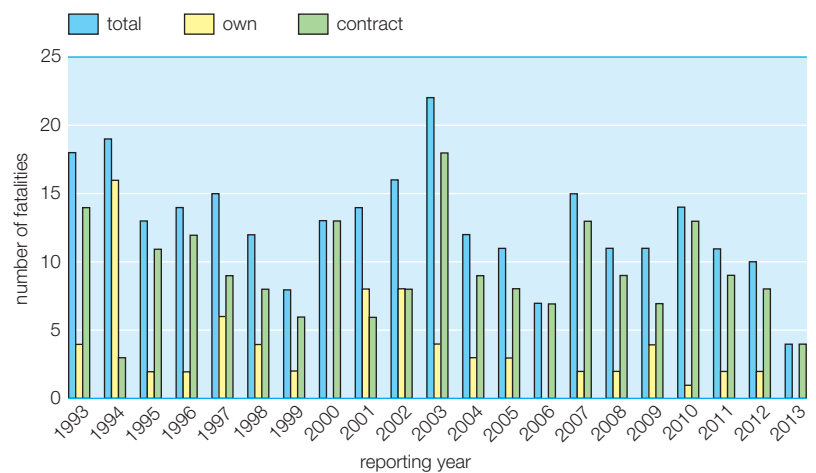


Figure 4 Relationships between incidents and fatalities for the European downstream oil industry

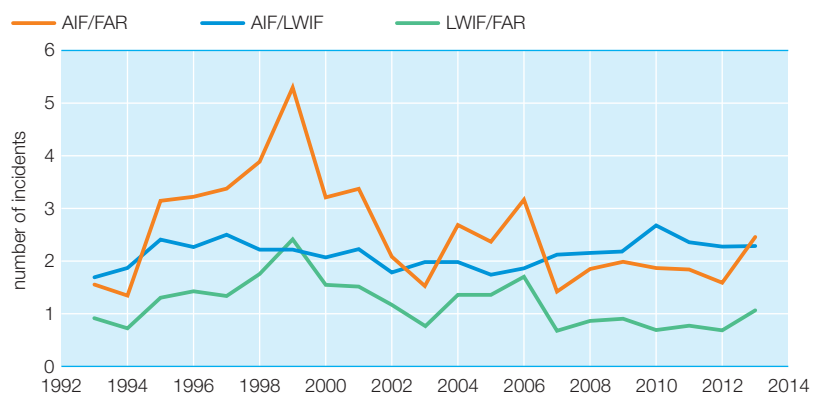


Figure 5 Lost Workday Injury Severity (LWIS) from 1993–2013 and the three-year rolling average for the European downstream oil industry

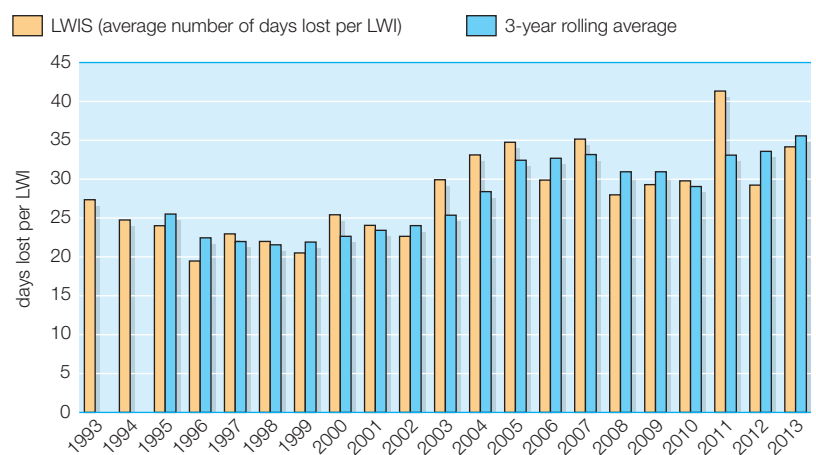
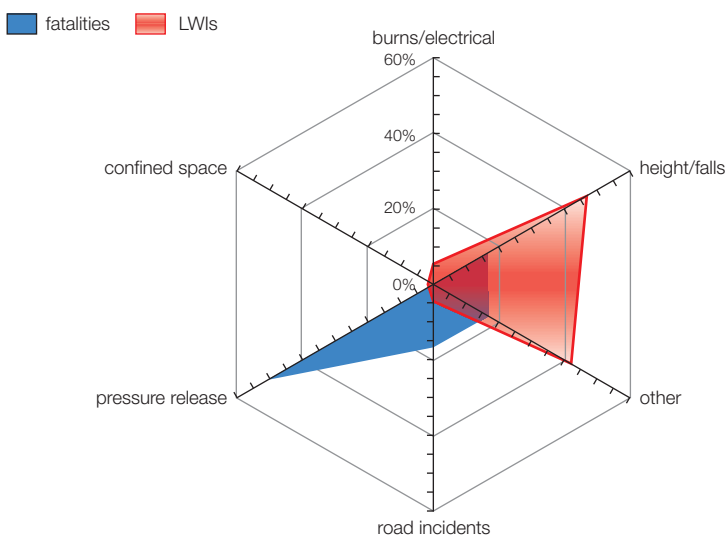




Table 2 LWIs and their causes

Cause		Manufacturing	Marketing	Combined	Percentage
Road accident	Road accidents	6	22	28	4%
Height/falls	Falls from height	24	42	66	10%
	Staff hit by falling objects	10	13	23	4%
	Slips and trips (same height)	89	121	210	33%
Burn/electrical	Explosion or burns	28	3	31	5%
	Exposure (electrical)	1	3	4	1%
Confined space	Confined space	3	2	5	1%
Other causes	Assault or violent act	0	11	11	2%
	Water-related, drowning	1	0	1	0%
	Cut, puncture, scrape	11	21	32	5%
	Struck by	37	25	62	10%
	Exposure, noise, chemical, biological, vibration	16	1	17	3%
	Caught in, under or between	28	19	47	7%
	Overexertion, strain	31	49	80	12%
	Pressure release	6	0	6	1%
	Other	9	11	20	3%
Total		300	343	643	100%

Figure 6 Reported causes on a percentage basis for LWIs and fatalities in 2013



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 643 LWIs were reported in 2013, of which only 20 (3%) could not be 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.

As can be seen from Figure 6, the percentage data for these LWIs in 2013 show that the distribution of LWI causes is quite different from those that resulted in fatalities.

This data being relatively new, there is no basis yet for a robust analysis of trends. Concawe will continue to collect this data in future years and the results should reveal trends that can be analysed in greater depth, providing valuable data to member companies that can then be used to improve on-the-job safety for employees and contractors.