

Occupational safety vs. process safety

Occupational safety – focuses on protecting the safety, health and welfare of people at work (sometimes called ‘personal safety’).

Process safety – focuses on major accident hazards associated with releases of energy, chemicals, and other hazardous substances.

What’s the issue?

The iceberg (or Heinrich) triangle

Through the collection of accident data, it is widely understood that beneath every major accident there are a few serious accidents, many minor accidents and many incidents (or near-misses). When we see a large-scale serious event (although these are rare), this is believed to only be the tip of the iceberg. It follows from this that, if you can substantially reduce the incidents and minor accidents, the rate of occurrence of more serious accidents should also reduce. This assumes, though, that each type of accident has a similar set of underlying causes. For instance a ship board programme to tidy up housekeeping and focus on injury accidents may reduce all types of injury accidents to virtually zero. Not only will there be a reduction in cuts and scratches but there will also be a reduction in serious injuries, and even deaths from similar causes. However, it will not address conditions that concern, say, how different cargos are stored and the danger of explosion, or how the ship is navigated. Those are the conditions that will affect whether the vessel stays afloat or not.

Occupational safety performance is often measured with reference to an accident ‘triangle’ or pyramid (e.g. Reference 1). A typical accident triangle suggests that there are hundreds of near-misses or unsafe acts for every fatality. An organisation that has excellent near-miss reporting for occupational safety may believe that it is doing well to control the potential for losses, but the process safety hazards may not necessarily be identified.

Is your company at risk of not focusing enough on process safety?

If the answer to any of the following questions is ‘Yes’, then you should take action!

	Yes	No
1. Is the safety performance of your worksites judged primarily based upon the number of personal injury incidents?		
2. Do management appear obsessed with occupational safety only, such as preventing road traffic accidents, slips, trips and falls?		
3. Is there a reluctance to report problems with the operability of critical plant equipment (e.g. poor design of equipment) that could contribute to a process safety incident?		
4. Are process safety reviews conducted only infrequently on site?		
5. Are losses of containment (e.g. leaking valves) tolerated and managed, rather than being investigated?		
6. Is there little or no evidence that management are monitoring possible leading and lagging indicators (see Briefing note 17) of process safety?		
7. Does the company show little understanding of the impact of ‘softer issues’ such as safety culture and leadership style on major accident hazards?		

What can I do about it?

Don't assume that by identifying and addressing unsafe behaviours relating to occupational safety, it will be possible to influence process safety. In some cases, there may be a link (e.g. a lack of risk awareness may lead to either an occupational or process safety incident), whereas in other cases they will be unrelated. Those within the company who are responsible for safety should understand these differences and the problems with the safety triangles approach. Process safety and major accident hazards should be considered separately from occupational safety, by examining near-misses and looking out for unsafe conditions, but also looking more broadly at how leadership, culture, and contractor management could introduce risk to the process.

What should my company do about it?

Management should ensure that there is an appropriate balance between identifying hazards to occupational safety and hazards to process safety. This is practically achieved by ensuring that the following are supported by guidance covering both process and occupational safety:

- 'Reactive' processes (e.g. reporting and investigation).
- 'Proactive' processes (e.g. routine maintenance checks, process safety reviews).

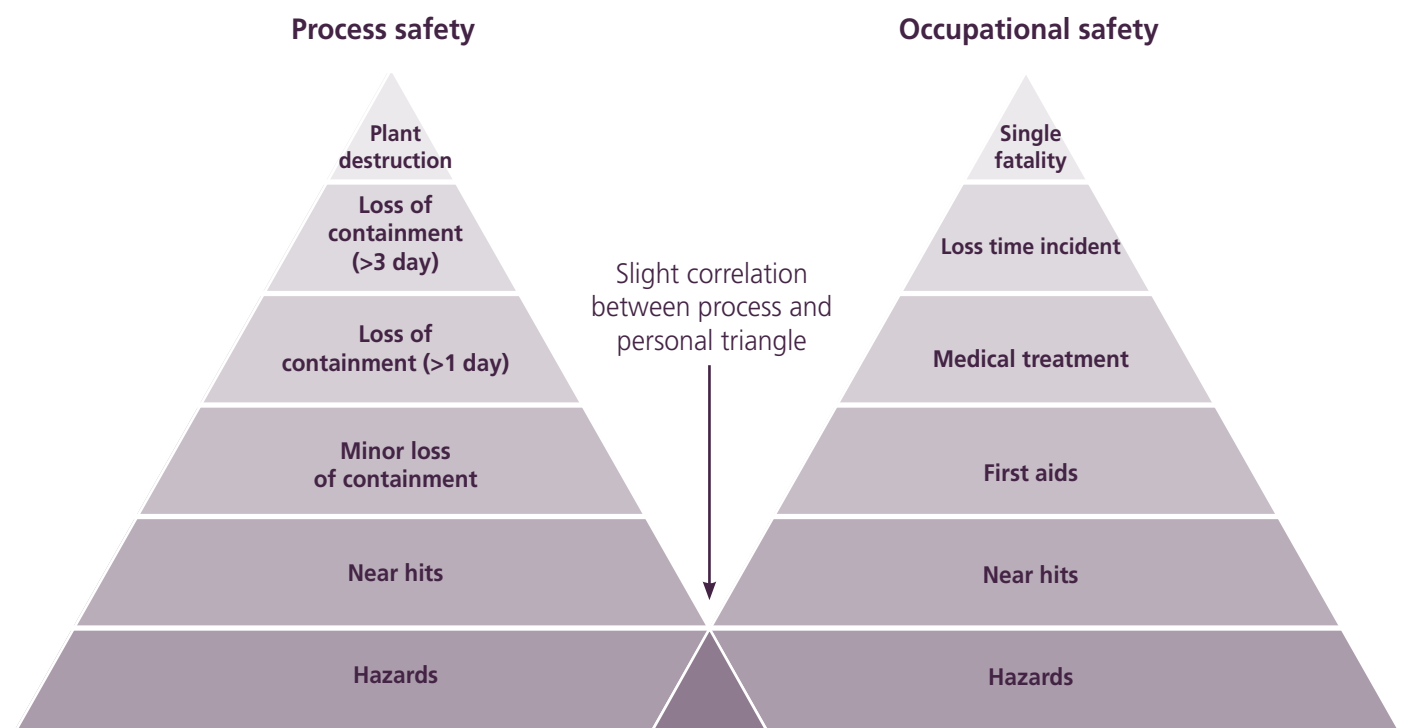
Although occupational safety incidents are more frequent than process safety incidents, they tend to be much less severe. It is tempting for organisations to focus a lot of effort on such cases, but it is paramount that they avoid the complacency that a low frequency of occupational safety incidents can encourage. One way to avoid this is to develop a healthy level of scepticism

CASE STUDY 1

At approximately 1.20 pm on 23 March 2005, a series of explosions occurred at the BP Texas City refinery during the restarting of a hydrocarbon isomerisation unit. 15 workers were killed and 180 others were injured. Many of the victims were in or around work trailers located near an atmospheric vent stack. The explosions occurred when a distillation tower flooded with hydrocarbons and was overpressurised, causing a geyser-like release from the vent stack. The US Chemical Safety Board (CSB) and the independent safety review (the 'Baker report') found that one of the main reasons for the incident was a focus on occupational safety that resulted in a false sense of security regarding process safety.

Source: US Chemical Safety Board

Figure 1 Process safety and occupational safety



Courtesy: Southern and Scottish Energy

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in safety performance data, so that when performance is good, the organisation continues efforts to identify hazards and potential hazards.

Companies can raise awareness of the potential pitfalls of over-focus on occupational safety at the expense of process safety using lessons learned from Texas City and published in the Baker report (Reference 2). Such education should emphasise the similarities and differences between process safety and occupational safety, as shown in the Figure 1.

Some hazards will be common to process safety and occupational safety; others will be unique to one or the other. Management and other personnel should understand where the overlap is for their operation, but just as importantly what the differences are.

Several human factors tools and techniques can be used as part of a process safety review process, and these are explained in other briefing notes. For example, Briefing note 2 *Alarm handling*, Briefing note 4 *Maintenance*, Briefing note 8 *Ergonomics*, Briefing note 13 *Human reliability analysis*, Briefing note 15 *Incident and accident analysis* and Briefing note 16 *Human factors integration*.

Management responsibility

Management should ensure that the resources are in place to allow all aspects of safety to be monitored, not just occupational safety, but process safety as well. Such resources should include appropriate training and education, time to cover the different aspects of safety, appropriate reporting and recording systems and the time to address any issues raised.

Management should also foster a culture within which personnel are comfortable reporting safety issues without fear of any kind of negative action. See also Briefing note 9 *Safety culture*.

CASE STUDY 2

“Process safety management... isn't something which can simply be left to individual sites to do. It actually requires clear accountability at all levels, is a company Board issue, and it needs effective measurement systems, including indicators of process safety performance.

So it is necessary, as part of the management of the operation, to actually pose questions such as 'what are your key business risks?', and 'do your Board members take the same view as your frontline managers and your plant operators?' A key business risk is clearly that of having a serious accident or incident. It is bad enough if it affects purely people on site: it is quite catastrophic if it goes beyond that.”

Source: Geoffrey Podger, Chief Executive, HSE. <http://www.hse.gov.uk/leadership/mhconference.htm>.

CASE STUDY 3

Personal versus process safety indicators

“Let us be clearer, first, about the distinction between personal and process safety. It is really a distinction between different types of hazards.”

- Process safety hazards are those arising from the processing activity in which a plant may be engaged.
- Typical process safety incidents involve the escape of toxic substances and the release of flammable material which may or may not result in fires or explosions.
- Many process safety incidents either damage the plant or have the potential to damage the plant. Moreover, they have the potential to generate multiple fatalities.
- The term process safety originates in the US; in some other parts of the world process safety is referred to as 'asset integrity' or 'technical integrity'.
- Personal safety hazards, on the other hand, affect individuals but may have little to do with the processing activity of the plant. Typically they give rise to incidents such as falls, trips, crushings, electrocutions and vehicle accidents.
- It turns out that most injuries and fatalities are a result of personal safety hazards rather than process hazards and, as a result, injury and fatality statistics tend to reflect how well an organisation is managing personal safety hazards rather than process safety hazards.

Source: Andrew Hopkins (2007), *Thinking about process safety indicators*, Working Paper 53, National Research Centre for OHS regulation.

References

1. Heinrich, H.W. (1931), *Industrial accident prevention: a scientific approach*, McGraw-Hill.
2. Baker, J.A. et al (2007), *The report of the BP US refineries independent safety review panel*, BP, <http://www.bp.com>.

Further reading

- AIChE (2003), *Guidelines for investigating chemical process incidents*, 2nd ed, Center for Chemical Process Safety (CCPS), Wiley.
- HSE (1997), *Successful health and safety management*, HSG65, HSE Books.

For background information on this resource pack, please see Briefing note 1 *Introduction*.