Counting the costs of chemical incidents

With the economic downturn forcing businesses to tighten their belts and cut costs, Benn Heatley, from the UK’s National Chemical Emergency Centre (NCEC), explores the business case for investing in safety now to prevent chemical accidents in the future.

Small accidents may not be trivial

The consequences of a lack of control when using chemical substances in the workplace are well known and apparent. Any health and safety expert can tell you of at least one major accident whereby poor chemical management policies and procedures have lead to disaster. Examples include Bhopal, Grangemouth, Flixborough, Seveso and more recently, Buncefield. Major accidents like these cost the companies responsible tens of millions of pounds and often lead to calls for improvement in safety standards. Indeed, in the aftermath of major accidents European and UK legislators have often responded with ever more stringent requirements for chemicals to be controlled throughout their lifecycle. Thankfully, incidents of this kind are comparatively rare and continuous improvements in safety at large chemical installations mean that they are less likely to occur now, than at any point in the past.

Owners of major chemical installations tend to have the resources and expertise in-house to control precisely all the production processes, as well as complying with the raft of health and safety legislation that is now in place. However, what of the small-scale chemical users, formulators or transporters? Such organisations may not have the in-house resources or expertise to fully understand and control the hazardous substances they use in the course of their daily business. Nevertheless, they are expected to comply with much of the same legislation that the larger sites also have to follow. So how are the small-scale chemical users coping?

Disturbingly often, the answer is not very well. Although accidents involving small-scale chemical users tend to be less serious than those major incidents we all know of, they can still have serious implications for the organisation concerned and their employees.

The 2007/08 UK Health and Safety Executive (HSE) statistics on workplace injuries show that in the service sector alone, where one would only expect to see very small-scale use of chemicals, there is a significant injury toll from “exposure to, or contact with, a harmful substance”. Combined, there were just under 3,000 “major” injuries (categories include loss of sight, chemical burn to the eye and unconsciousness) and “over 3 day” injuries (where the injured person is unable to work, or perform their normal duties, for more than 3 consecutive days). From the serious nature of the injuries often suffered, it is clear to see that ‘small-scale’ chemical accidents are often far from trivial.
Counting the cost of chemical incidents

In addition to the human cost, many businesses often overlook the financial costs of such accidents. They can have a debilitating impact on a business and, in these uncertain economic times, can even threaten business continuity. Direct costs can impact immediately after an accident; some examples are shown in table 1.

Many employers might think that their insurance will cover all accident costs, but the HSE estimate that for every £1 of insured costs, the organisation will typically incur a further £8-£36 of uninsured costs. These indirect underlying costs normally include downtime due to the accident itself, lost time due to injured persons, decrease in business function, loss of customer confidence and a lessening of reputation. Furthermore, an increase in accidents or a claim for an accident may lead to an increase in insurance premiums. Case studies show that poor health and safety standards can sometimes lead to an increase of as much as 100%.

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost following a chemical accident</th>
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</thead>
<tbody>
<tr>
<td>Spillage clean-up costs</td>
<td>Variable depending on spill, but at least several thousands of pounds.</td>
</tr>
<tr>
<td>Enforcement action - HSE</td>
<td>In 2007/08, the average penalty was £12,896 per conviction. Serious breaches can attract fines anywhere up to 10 times this amount.</td>
</tr>
<tr>
<td>Enforcement action – Environment agency</td>
<td>Magistrates’ Courts: up to £20,000 fine. Crown Court: unlimited fine.</td>
</tr>
<tr>
<td>Compensation payments</td>
<td>Typical values are £2,000-£4,000. Claims can, however, be anything from one pound to hundreds of thousands of pounds.</td>
</tr>
<tr>
<td>Damage to equipment, materials, property and environment</td>
<td>The cost depends wholly on what has been damaged and can range from very small figures to enough to cripple a large company, especially if fire is involved.</td>
</tr>
</tbody>
</table>

A real life example

In its role as one of the leading global chemical emergency response centres, NCEC receives thousands of emergency calls a year. Last year, over 20% of all calls handled related to incidents where either first-aid advice was required following chemical exposures, or advice was required following a chemical spillage or release. This averages out to just over 2 incidents a day, every day of the year. It is true to say that the small-scale chemical users or producers will likely have smaller quantities of hazardous substances on site, but even small
quantities can translate into a serious risk of costly accidents occurring if they are not understood or managed properly.

For example, in recent weeks NCEC was called by the Fire Brigade to offer advice on an ongoing incident at a leisure centre complex in the Midlands. Two substances used on-site to clean the swimming pool, hydrochloric acid and sodium hypochlorite, had been accidentally mixed, resulting in the evolution of chlorine gas. Chlorine gas presents a raft of hazards that are quite different from the substances from which it is produced. Chlorine gas is corrosive to human skin and eyes as well as metals. It is toxic via inhalation and can cause delayed pulmonary oedema, anything up to 48 hours after exposure, by attacking the walls of the lungs. The gas is also a powerful oxidising agent, which means that it can make surrounding combustible materials more susceptible to ignition.

Because of this, the Fire and Ambulance crews had to treat the scene with extreme caution and only with the expert help and advice from NCEC could the emergency be dealt with safely. Nevertheless, later reports indicated that up to 50 people were affected by the gas (many of them children) and 32 had to be taken to hospital. The surrounding area around the leisure centre had to be evacuated during the incident and the pool itself remained closed for days after.

This case is a prime example of an organisation whose primary business is not in chemicals, but who still use hazardous substances that can cause serious harm. It demonstrates what can happen when risks are not properly identified and controlled, resulting in serious ramifications for people’s health and safety, the environment and even the continuity of the business itself. This case shows that many businesses face chemical risks that they do not fully appreciate. A business may well assess the risk posed by chemicals in isolation, but as this case shows, some substances have the potential to react, or change, to produce different, more hazardous products. Could your business afford the cost and disruption of such an incident?

**Missing the point about safety**

The best way to reduce the risk of costly chemical accidents threatening your business is to put in suitable control measures to stop them happening in the first place. In order to do this, chemical substances used must be understood and the risk they pose to the organisation must be assessed. This approach is well known and not only makes good business sense, but also is a requirement of specific legislation such as the Control of Substances Hazardous to Health (COSHH) regulations.

Despite the notoriety of COSHH, in our experience at NCEC, we have found that many small-scale users of chemicals consider the Safety Data Sheet (SDS) provided by their supplier as being sufficient to satisfy their duties under COSHH. This of course completely misses the point of proper chemical risk management.
It would seem that some organisations have developed a ‘box-ticking’ approach to COSHH that does not actually address or control the risk. HSE statistics indicate that the COSHH regulations alone were cited as the reason of issue for nearly 900 enforcement notices in the period 2007/08. Clearly, many are getting it wrong. So how do you make sure you get it right before an accident occurs?

The first thing that must be done is to understand what you are dealing with. Although an SDS will be an invaluable tool for doing this, it is not the only data source that should be used. There is a wide range of data sources available for finding out information on chemical substances, many of which are published by the EU and the HSE. Chemical hazards can be physiochemical (such as flammability), health related (such as toxicity), or environmental. All of these hazard categories must be considered along with any special properties a material may have and the materials susceptibility to change following chemical reaction or a physical change (such as pressure or temperature).

Some acronyms and codes may be confusing, so NCEC has developed it’s own free and simple-to-use web application, making interpretation of legislative codes easier. There is really no excuse these days for complacency!

**Getting it right first time**

Only once substances are understood is it possible to assess the risk that they pose in the context of your business activities. Assessing the risk of chemical accidents means looking at factors such as how the substance is used, stored or transported within your business and then how it might damage people, property or the environment. There are a number or well-established methods for doing this, such as HAZOPs (hazard and operability studies), FMEA (failure mode and effects analysis), FTA (fault tree analysis) and ETA (event tree analysis), the principals of which can be applied to any organisation handing hazardous substances. Past experience of chemical emergencies or near misses can also be a good indicator of who might be harmed and how.

Once the risks have been decided upon, they can be controlled. Again, this is specific to each organisation, but reference to best practice, specific legislation and expert advice can help identify ways in which the risks might be controlled. For example, COSHH sets out a hierarchy of control, which gives a framework for doing this. The general hierarchy follows that employers should; eliminate hazardous substances, enclose the process, control with engineering methods (for example local exhaust ventilation), and finally, provide adequate protective equipment.

Recording and implementing these simple steps, along with regular performance reviews, are often all that is needed to prevent accidents occurring at your site. However, it must not be forgotten that even the most thoroughly planned systems can still fail. Therefore the careful consideration and planning of emergency
procedures is essential to mitigate the consequences of an accident, should the worst happen.

The key to this whole process is knowledge of what you are dealing with and of industry best practice. Many organisations can fail at this step, as they simply do not have the specialist staff to effectively achieve a good level of chemical risk management. The Management of Health and Safety at Work Regulations (MHSWR) 1999 refer specifically to “competent persons” being required to assist in undertaking the measures required in the relevant statutory provisions. Employers must then ask themselves if they have the chemical expertise, skills and experience in-house to properly assess and manage the hazardous substances they use.

Thankfully, there are a number of software tools around designed to assist H&S managers with the administration of SDS and COSHH. For example, NCEC has developed an easy-to-use COSHH assessment module as part of its ChemeDox online chemical documents management suite.

**Acting now will save you money**

Expert chemical knowledge is something not every organisation can afford to have in-house; however, not every organisation needs this on a day-to-day basis. The most suitable approach for many is to periodically use the services of a chemical expert via a specific chemical safety audit. Audits generally form part of good health and safety management. Chemical safety is no different and a relatively small investment in a specific chemical safety audit can help you understand the substances you use, what risk they might pose and help you find new ways to meet best practice and control those risks.

In many instances investing in an audit cannot only help to prevent costly chemical accidents, but can also actually save money through reduced insurance premiums. There are many examples of insurers reducing the liability insurance premiums where proactive and positive steps such as a chemical safety audit have been taken by businesses, sometimes by as much as 50%. Savings of this nature often more than amply offset any initial investment on a chemical audit.

Chemical substances can pose a multitude of different hazards, but hazard does not have to equal risk. If substances are managed and used properly following the advice of an auditor who is an expert in chemistry as well as chemical legislation and best practice, the risk to your organisation can be minimal. Proper risk management means that you have the potential not only to save lives, but also to save money, now.
References

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3. HSE Statistics on enforcement action
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7. HSE Statistics on enforcement notices
8. The Management of Health and Safety at Work Regulations 1999, Section 7

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NCEC offers a chemical safety audit solution to organisations that use chemicals and want to ensure they don’t suffer the cost of a chemical accident. Our leading consultants are top experts in their field, being trained to deal with chemical emergencies and having wide legislative knowledge as well as being leading business consultants. NCEC is a division of the leading environmental consultancy, AEA technology, who regularly assist Government with evidence based policy development and solve environmental challenges to improve organisational performance. Therefore in addition to the chemical safety audit NCEC also offer environmental performance audits with the express aim of targeting costly energy wastage and thereby saving businesses money.