Risk: Tools of the Trade

Andy Brazier asks are you satisfied that everything 'reasonably practicable' has been done to reduce risk?

IN THE previous article (*TCE* 958, April 2021) a case study was used to illustrate how safety study methods can help you to look at your systems in a systematic and objective way; and this can help you to identify possible ways of improving safety. However, every method has its limitations, and none can actually decide for you whether your system is safe. That has to be your decision and requires you to use your judgement about what is reasonably practicable.

WHAT IS A SAFE SYSTEM?

Having a low accident rate may give you reassurance that your system is safe. But major accidents only happen infrequently. The fact that you have not had one cannot be taken as evidence that you will not have one in the future.

You may take some comfort in assuming that places that have experienced major accidents were particularly bad at managing safety. There will usually have been breaches of regulations, failure to follow good practice, and people made errors. But these insights are only gained with the benefit of hindsight – after the accident. When you look at the evidence more closely you will usually find that people working at the company knew that things were not perfect, but did not recognise how a number of relatively minor things acting together could cause a catastrophe.

Ultimately the only safe system is one without hazards. Whilst you should always be looking at opportunities to eliminate hazards as part of inherent safety, it is very rarely possible if you want to stay in business. This is why you need systems to make sure you are managing your hazards effectively. The phrase "what gets measured gets managed" may lead you to look for hard data to determine safety performance. If only there was a device that would give you an objective measure of safety. This desire may explain the obsession we sometimes see with collecting data, which sometimes diverts attention from the really important issues.

Another phrase (usually attributed to Albert Einstein) that is

FIGURE 1: IF WE COULD MEASURE SAFETY OBJECTIVELY

much more relevant is "everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted."

YOUR SAFETY RESPONSIBILITIES

Everyone has some responsibility for safety. As a minimum you need to work in a way that avoids harming yourself and others. In the eyes of the law your employer usually has the ultimate responsibility. But a company only functions through the people it employs. That includes you.

If you work in the process industry it is highly likely that a range of different safety studies have been carried out. You may think that doing these can prove that your company is safe. But it is very unlikely that every type of safety study has been carried out – there are a lot to choose from. Also, the quality of the studies will depend on who was involved and the information they had available. Performing a study does not make anything safe. The findings have to be implemented effectively. What part do you play in this?

If you are a senior manager you may not believe that you should be actively involved in safety studies. You may think your responsibility is to make sure the resources are in place to carry out the studies and implement the findings and so are reassured when the consultant's invoice arrives or you are asked to sanction expenditure on new safety systems. As long as you sign the cheques you may satisfy yourself that you have fulfilled your responsibilities. How can you be sure that the people working on your behalf are taking safety seriously and how does your leadership style affect their behaviour?

If you are a process safety engineer your safety responsibilities appear to be fairly clear. You will be actively involved in safety studies and help by identifying improvement actions. As long as people follow your recommendations you may satisfy yourself that you have fulfilled your responsibilities. How do you know whether your recommendations are appropriate, reasonable, or sensible?

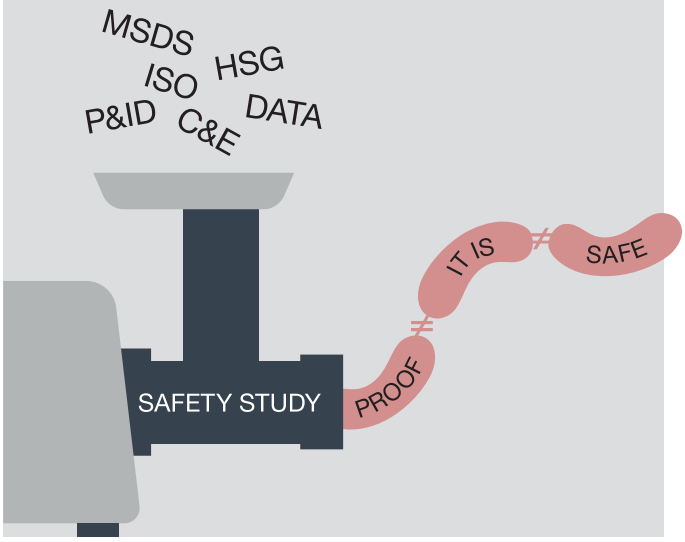
If your job is in operations or maintenance you are probably the closest to the hazard most of the time. If an incident happens you are most likely to be harmed and often the most likely to be blamed. Hopefully your employer has an effective "just" or "no-blame" culture that means you are not immediately held accountable for every incident that occurs. If safety studies have been carried out, you follow the procedures and use the safety equipment provided, you may satisfy yourself that you have fulfilled your responsibilities. Is this really enough?

ARE SAFETY STUDIES GIVING YOU A FALSE SENSE OF SECURITY?

Carrying out safety studies is rarely mandated in regulations but it is often recommended in guidance. The methods generally encourage you to go beyond compliance and to apply industry good practice. Using them for periodic reviews can also help you with continuous improvement, which is often stated as an aim or requirement.

But you need to be careful. A safety study is not like a sausage machine where you feed information in at one end and get proof that everything is safe at the other. It is simply a way of structuring your assessment. The findings may help you decide how safe your systems are but it will not make that decision for you.

FIGURE 2: 'SAUSAGE MACHINE' SAFETY STUDY. DO YOU REALLY BELIEVE THIS PROVES YOUR PLANT IS SAFE?



THE TOOLS IN YOUR TOOLBOX

The different safety study methods are your tools of the trade.

It is always important to choose the right tools for the job. You may be able to drive a screw into a piece of wood with a hammer, but that does not mean it is a good idea. A screwdriver is a much better option, but no good for knocking in nails. Multi-tools that can do many jobs may exist, but can have even bigger compromises. For most jobs you need more than one tool; and it is the same with process safety. All safety study methods have their limitations. Instead of looking for the one method that does everything it is better to view each as a tool in your safety toolbox. You should use several, because each allows you to look at your systems from a different perspective.

DO YOU PREFER QUANTIFIED ASSESSMENTS?

If you are an engineer or have a technical background it is highly likely that you are comfortable with numbers. This may lead you to favour safety studies that give quantified results. Methods like quantified risk assessment (QRA) may be viewed as a specialised method with limited application. Layers of protection analysis (LOPA) is a more recent development and is quickly becoming a more mainstream or standard approach.

Harvey Dearden[1] points out that identifying safety integrity levels (SILs), which is often the main objective of carrying out a LOPA study, requires you to "employ a variety of guesses about, for example; hazard consequences, demand rates, failure rates, and safe failure fractions." He admits that he uses the term "guess" for dramatic effect to emphasise the fact that functional safety is not an exact science. Quantified safety study methods have their limitations, like all of the other methods. Introducing numbers can give the illusion of being more accurate, when in reality those numbers are actually a source of even greater uncertainty. You may find that a quantified method helps you in your assessments, but you need to make sure that you and your colleagues use the results with great caution. Using conservative numbers may appear to be the safest option but it may lead to you spending unwarranted time and effort reducing a risk, which could be better spent elsewhere.

WHAT SHOULD YOU BE DOING?

There is rarely any specific requirement to carry out a safety study. The requirement is simply to make sure that your systems are safe. However, absolute safety cannot be achieved without removing all the hazardous materials and conditions, which is rarely possible. This means the actual requirement is to ensure that you properly understand your risks and can demonstrate that they are as low as reasonably practicable (ALARP).

Although the ALARP concept was introduced a while ago it is not always clear what it means in practice and it can appear to be complex. However, buried deeply in the UK Health and Safety Executive's (HSE) guidance for permissioning under the Control of Major Accident Hazards (COMAH) regulations[2] is the following:

ALARP demonstration for individual risks is essentially a simple concept which can be satisfied by the operator answering the following fundamental questions:

Question 1 – What more can I do to reduce the risks?

Question 2 – Why have I not done it?

You should note that HSE uses the pronoun "I" in these questions. It implies that deciding if risks are ALARP relies on assessments made by individuals on behalf of a company (described as "the operator" by HSE).

It does not matter what role you have in a company. If you are working with major accident hazards you need to make sure you can answer these questions. Safety studies may help you make sense of the situation, but only you can decide. Ultimately you have to decide for yourself whether enough has been done to identify and understand the risks; and that the right decisions have been made about how they should be controlled. A test of how comfortable you are with your decision is how well you can explain it to other people. It is not enough for you to feel that your system is safe enough; you should be prepared to put your reputation on the line by using what you know to make a defendable judgement.

CONCLUSIONS

We have a range of excellent safety study methods in our toolkit. But none can cover every issue and ultimately you need to use your judgement to decide whether risks are ALARP. The Engineering Council[3] has highlighted this in its guidance on risk by saying "risk assessment should be used as an aid to professional judgement and not as a substitute for it."

The concept of continuous improvement is almost engrained in our psyche. This may lead you to believe that you should always be adding more risk controls. This can explain why new engineered safety devices are often recommended during a safety study. But there must come a time when our efforts add no value and start to become counter-productive. Ultimately, as an engineer, manager or someone else with responsibility for a hazardous facility you have to take ownership of safety, satisfy yourself that everything reasonably practicable has been done, and be prepared to defend your judgement.

Next month's article will discuss how you should examine the way risks are manged in the real world to decide whether the risks are really ALARP. ■

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REFERENCES

1. Dearden, H, 2017, *Professional Engineering Practice*, JR Smith Publishing.

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3. Engineering Council 2011, *Guidance on Risk for the Engineering Profession*, https://www.engc.org.uk/risk.