RISKworld

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In This Issue

Welcome to Issue 18 of RISKworld. If you would like additional copies please contact us, and feel free to pass on RISKworld to other people in your organisation. We would also be pleased to hear any feedback you may have on this issue or suggestions for future editions.

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Contents

Introduction
Alan Hoy launches our new website, provides a brief update on Risktec and introduces this edition of RISKworld.

ABC of asset integrity
Sean Wilkinson introduces us to the emerging discipline of Asset Integrity Management.

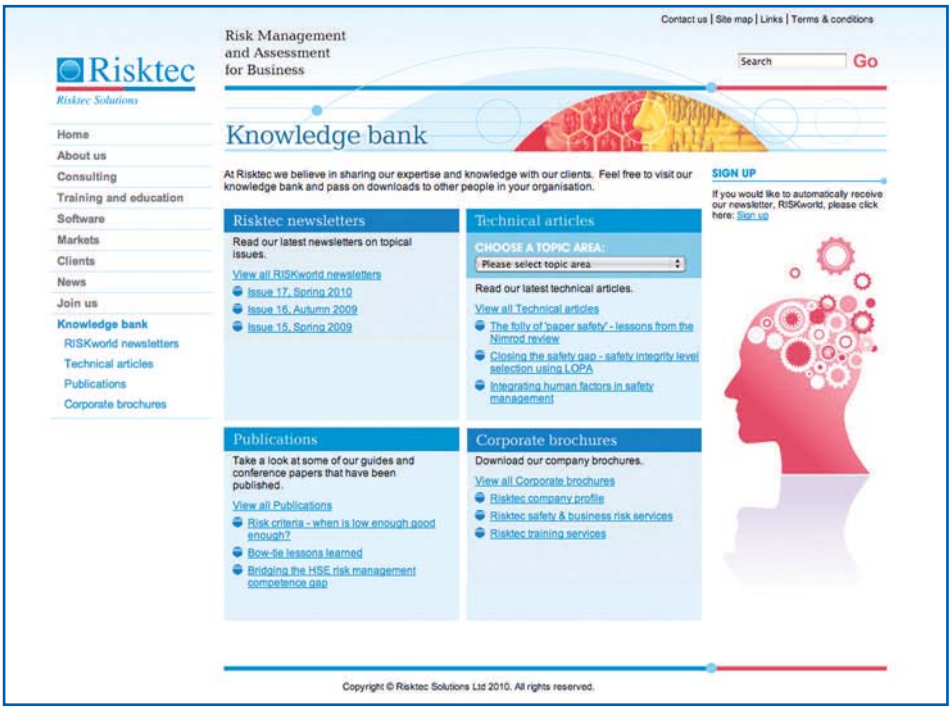
Deepwater aftermath
In the wake of the Deepwater Horizon accident, Kris Smith examines the parallels with the UK's Piper Alpha disaster.

Hazard identification 101
Arguably the most important building block of any risk assessment, Andy Lidstone provides tips for successfully identifying hazards.

People power
Ali Southan introduces the discipline of behavioural safety and explains how to get the best out of people.

Going nuclear
Preparing a country for nuclear power generation means more than just building reactors – John Llambias looks at how to develop a regulatory regime from scratch.

Risktec's Online Knowledge Bank Launched



We are delighted to announce the launch of our new website, which includes a dedicated 'knowledge bank' with hundreds of downloads. The idea behind this initiative is to promote our commitment to share our knowledge. Feel free to visit www.risktec.co.uk and have a browse.

With 9 years of successful operation, Risktec has grown considerably and provides a wide range of specialist risk and safety services to clients throughout the world. This growth has been recognised by our appearance in the 'Hot 100' list of the UK's fastest-growing private companies and in the Sunday Times International Track 100, which measures export revenue growth of UK companies. Risktec is the only risk management firm on each list.

Risktec's Managing Director, Alan Hoy, comments, "We are pleased to have been included in these independently compiled rankings, but we have not grown for growth's sake. Rather, our growth is a reflection of the calibre of the people who work for us and the quality of the work they produce. It is founded on high levels of client satisfaction and the resulting repeat and referral business. We work for some of the world's most impressive companies, and naturally they expect high standards from their suppliers".

This edition of RISKWorld includes a range of topical articles. Those of us involved in safety and risk management who are passionate about helping to prevent major incidents will have followed the unfolding events of the Deepwater Horizon accident with considerable professional interest. The tragic loss of life, considerable environmental damage and huge financial implications will have a major impact on future regulatory requirements and prompt considerable revaluation of risks by organisations around the world.

Striving to achieve a reduction in significant incidents requires the deployment of an often mind boggling array of processes, initiatives, tools and techniques. But our message remains simple – have a deep understanding of the risks you face; implement a well considered safety management strategy with discipline; and develop a proactive culture for your competent people to thrive in.

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An Introduction to Modern Asset Integrity Management

The recent Deepwater Horizon incident in the Gulf of Mexico reinforces the fact that every operator of high-hazard physical assets is exposed to low-frequency high-impact risks. Every operator has a corporate goal of preventing major incidents by managing the governance and integrity of its assets. A robust corporate asset management framework, within which an integrity management regime can operate, is one way of achieving this aim.

Good practice in asset management

Increasing international consensus on good practices for managing physical assets led to the publication of PAS 55:2008 [Ref. 1], a specification based on the familiar BS ISO format used in such widely adopted standards as ISO 14001 for environmental management and OHSAS 18001 for safety management. Fifty participating organisations (in 15 industries and 10 countries) were involved. A number of global energy and transport organisations have already been certified as complying with the standard and interest in the industrial community is growing rapidly.

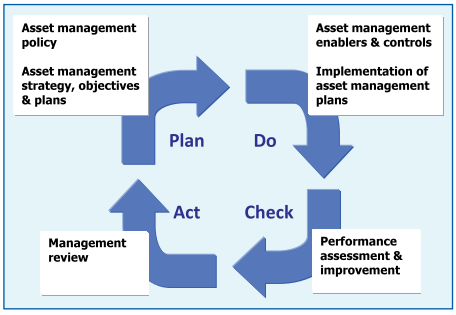
Asset management is defined in the standard as: *Systematic and coordinated activities and practices through which an organisation optimally and sustainably manages its assets and asset systems, their associated performance, risks and expenditures over their life cycle for the purpose of achieving its organisational strategic plan.*

Put more simply, it is the optimal management of assets over their whole life cycle.

PAS 55 primarily focuses on managing physical assets, though the other broad categories of 'assets' such as human assets, information assets, financial assets and intangible assets (reputation, etc.) are considered where they have a direct impact on the effective management of physical assets.

Requirements

PAS 55 defines 28 explicit requirements, arranged under 6 main groups within the quality management Plan-Do-Check-Act (PDCA) framework [see figure].



It's not easy

Delivering the best value for money in the management of assets and their integrity is complex and involves careful consideration of the inevitable trade-offs between short-term and long-term benefits, or between performance, cost and risk across all stages of the assets' life cycle. This often requires a fundamental review of stakeholder expectations, as well as a consistent and scalable method for determining the criticality and value of assets and activities.

Having a modern asset management system to manage asset integrity is clearly essential if an organisation is to optimise the diversity and complexity of such trade-offs in line with its corporate objectives, priorities and chosen risk profile.

The risk management 'enabler'

A key requirement is the risk management 'enabler'. There is a need to establish and implement robust risk management processes and identify and assess credible risks, whether due to physical failures, natural environmental events, the supply chain, or stakeholder dependencies. Most important is the need to ensure the results of these processes are used to inform the asset management strategy, identify adequate resources and competency needs, and determine the controls for the asset's life cycle.

The toolbox of techniques to help achieve this includes:

- Safety & risk management (HAZID, HAZOP and QRA)
- Safety integrity level (SIL) studies
- Process system integrity studies
- Risk-based inspection
- Condition monitoring studies
- Reliability-centred maintenance
- Damage identification & risk assessment

A guide on asset integrity published by the International Association of Oil & Gas Producers provides detailed good practice on the asset integrity risk management process [Ref. 2].

Benefits

Typical benefits quoted from the successful implementation of modern disciplined approaches to asset management [Ref. 3] include:

- 17% increased output at 50% lower operating cost (Shell North Sea oil platforms)
- 28% reduction in planned system downtime (National Grid)
- 29% increased output at no extra cost (Baltimore power generation)

As well as optimising the return on investment in assets, other benefits include demonstrating compliance with regulation, improving proactive risk management and governance, and sustainability commitment.

Successful implementation

Simply having a set of processes and procedures for asset management is one thing, successfully implementing them is quite another. Overcoming a 'silo' mentality between different departments is a common hurdle. Other critical factors for successful implementation include:

- Senior management buy-in and support
- Understanding and managing all asset related risks
- Defining, collecting and using the correct information to inform decisions
- Regular reviews and challenging of asset management related activities

Conclusion

Asset integrity management isn't about squeezing as much life out of assets as possible; it is about ensuring consistent performance of assets, throughout their lives, to deliver the business objectives profitably and without major incident. PAS 55 provides a good practice asset management framework for robust integrity management. The resulting performance, cost, safety and reputational benefits would appear to be well worth the sustained effort.

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1. Asset Management, PAS 55:2008, BSi, September 2008.
2. Asset Integrity – The Key to Managing Major Incident Risks, OGP, December 2008.
3. What is Asset Management in 2010?, The Institute of Asset Management, 2009.

Deepwater Aftermath – Exploring the Parallels with Piper Alpha

On the evening of 20th April 2010, the Deepwater Horizon drilling rig was near to completing work on the MC252 deepwater well in the Gulf of Mexico when control of the well was lost. The oil and gas from the well ignited causing 11 deaths and the rig to sink. The oil continued to leak at the seabed for over 3 months and led to the largest offshore oil spill in US history. In July, the well operator, BP, took a charge in its financial results of $32 billion for the oil spill.

The US offshore safety regulatory regime is in the process of being overhauled, with the new Bureau of Ocean Energy Management, Regulation and Enforcement taking over from its predecessor, the Minerals Management Service (MMS). The MMS had been accused by President Obama of having a "cozy relationship" with the companies it regulated. Time will tell what the new regime will demand, but a more comprehensive, systems-based approach to safety and environmental management, together with stronger regulatory enforcement, are inevitable. One option would be to adopt something similar to the UK's safety case regime, which also sprung from disaster, and requires proving safety ahead of time rather than afterwards through audit.

UK's Deepwater Horizon

The seminal event in safety regulation of the UK North Sea was the Piper Alpha disaster over 20 years ago on the 6th July 1988. It remains the worst accident ever in the offshore industry, with the death of 167 workers. The report of the two-year public inquiry into the disaster, chaired by Lord Cullen, included 106 recommendations which were all accepted by the industry. Furthermore, regulation of the offshore industry was transferred to the Health and Safety Executive (HSE).

As a result of the Cullen report, the Offshore Installations Safety Case Regulations (OSCR) came into force in 1993 and, by November 1995, every installation possessed a safety case that had been accepted by the HSE. In principle, each safety case demonstrated that the company had a safety management system in place and had identified risks and reduced them to acceptably low levels.

Early lessons learned

A number of initial difficulties were experienced in applying safety cases, including excessive complexity, too much reliance on quantitative risk assessment (QRA) and lack of workforce involvement [see Box 1].

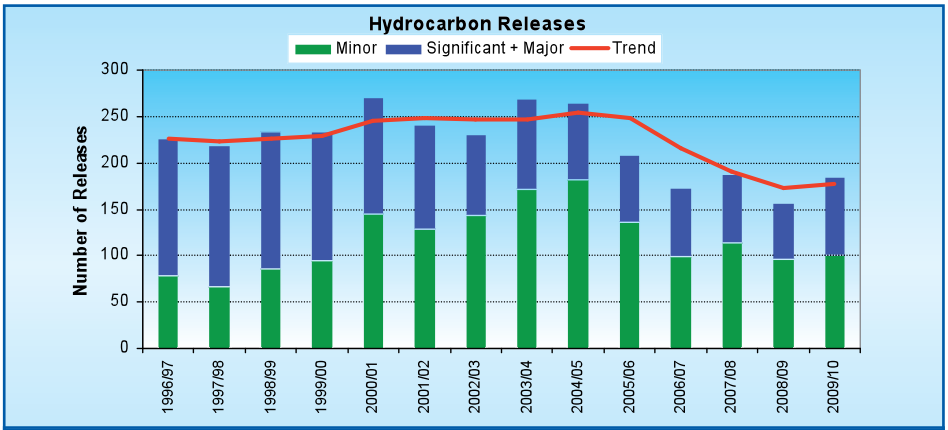

Figure 1 - Efforts to improve asset integrity in recent years have shown a general reduction in hydrocarbon releases in the UK North Sea (Ref. 2)

Box 1 – Early Lessons Learned

Excessive complexity
Initially, safety cases tended to be heavily orientated towards the need of ensuring acceptance by the regulator. Today, a better balance is struck by also addressing the needs of the operator's own staff.

Too many numbers
QRA was sometimes misused to justify situations that good engineering practice would deem unacceptable. Today, both QRA and good engineering judgement are recognised as important – the key is to get the balance right.

Lack of workforce involvement
Many early safety cases lacked the vital input from workers who had the most knowledge of the equipment and procedures. Today, the operator is required to demonstrate it has consulted with the workforce.

Measuring success

An independent evaluation of the offshore regime, published in 1999 by Aberdeen University, found that most stakeholders felt that the new legal framework aided effective management of risks, but there remained doubts about excessive regulatory complexity [Ref. 1].

As a result, the OSCR were revised in 2005, with the intention of relieving unnecessary burdens on operators and the HSE, and to enhance the safety case's value to the operator. The HSE was then able to redeploy a significant proportion of staff to undertake inspection and verification activities, which is expected to have greater safety benefits on balance.

The near universal opinion of the UK regulator and operators today is that safety cases have been very successful. There are of course difficulties, but they are not ones which demonstrate any fundamental flaws in the concept, rather they are issues of applying the concept in practice.

Improving asset integrity

Between 2000 and 2004 the HSE ran a specific programme aimed at reducing hydrocarbon releases – a key indicator of how well the offshore industry is managing its major accident potential. A further programme directed more widely at asset integrity management was carried out between 2004 and 2007. In 2009, the HSE reported that the industry had undertaken significant work to improve asset integrity.

The number of hydrocarbon releases in recent years has generally been falling [see Figure 1]. The number of major and significant hydrocarbon releases fell in 2008/09 to the lowest figure on record, but 2009/10 saw a jump back to the levels of 5 years ago [Ref. 2]. The UK offshore industry recognises it can never be complacent, especially for ageing installations.

Conclusions

Safety cases have been tried and tested in the UK offshore industry now for over 15 years as a technique to help manage major accident risks. While they are not a panacea and will not prevent all major accidents, all the evidence points to their success.

In the aftermath of the Deepwater Horizon accident, the US is currently evaluating the requirement for offshore safety cases, as well as other approaches. The "show and tell" basis of making a case for safety would appear well suited to the US.

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1. Revision of The Offshore Installations (Safety Case) Regulations 1992 (OSCR), Regulatory Impact Assessment (Final), UK HSE, June 2005.
2. Offshore Injury, Ill Health and Incident Statistics, UK HSE.

A Hazard Missed is a Hazard Uncontrolled

"The identification of areas of vulnerability and of specific hazards is of fundamental importance in loss prevention. Once these have been identified, the battle is more than half won." (Frank Lees)

It would seem reasonably self-evident that we can only manage risks that we are aware of. However, far too many accident investigations and inquiries, for example the Longford gas explosion and the Nimrod XV230 crash, point to inadequate or inappropriate hazard identification as being a root cause.

International standards and guidance [e.g. Refs 1, 2, 3] clearly show the importance of this key step [see figure 1], but leave open the question "How do we actually identify the hazards?". There have been attempts to try to develop advanced, automated and all-encompassing methods, but none have gained mainstream acceptance because either they are simply too complex to apply in practice, or end-users fear the 'black-box' output will be accepted without challenge. As a result, in general, there are four standard techniques that are most commonly used.

Hazard and Operability Study (HAZOP)

A HAZOP study consists of applying a set of guidewords (e.g. pressure, flow, temperature, etc.) to defined aspects of a design and challenging these with deviations (e.g. no, more, less, etc.). It is principally applied in a workshop environment to review process design but can also be applied, with altered guidewords, to railway systems, oil well design, procedural activities, etc.

Failure Modes & Effects Analysis (FMEA)

FMEA is a systematic review of the failure modes of an equipment item, e.g. pump, or system, e.g. Blowout Preventer, and their effects. It may also be extended to classify the severity (or criticality) of failures (FMECA). Although generally undertaken as a desktop exercise, workshops may also be held.

Checklists (HAZID)

Checklist applications range from identifying workplace hazards through to major events. Primarily a 'brain-storming' approach performed in a workshop environment, it is very dependent on appropriate checklist selection and the experience of the team.

What-If

What-If is also a team-based review using checklists, but may be more freeform, involving experienced personnel questioning possible deviations, e.g. "What if the wrong material is delivered?"

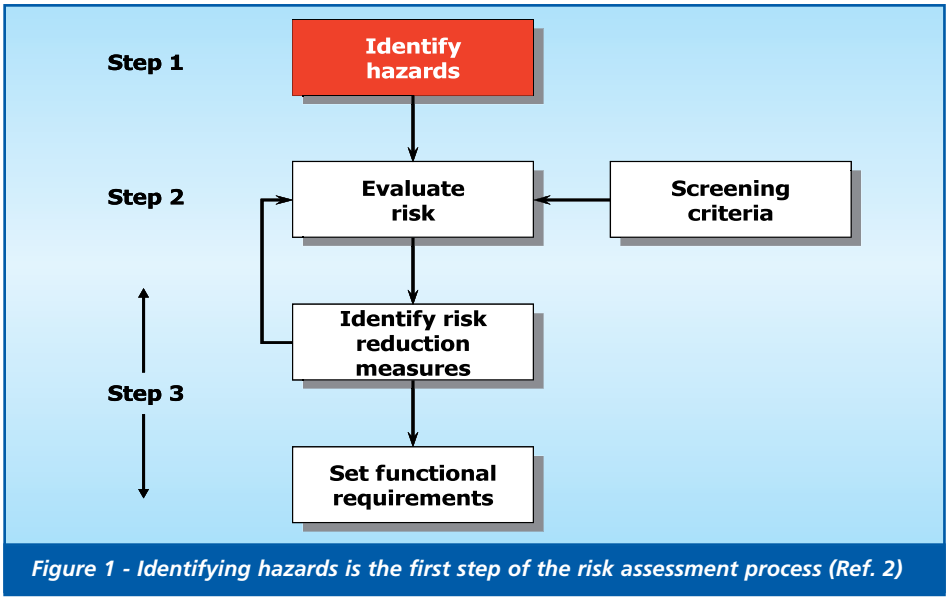

Figure 1 - Identifying hazards is the first step of the risk assessment process (Ref. 2)

The key to success

The key to successful hazard identification involves:

Choosing the right tool for the job

There is little point in trying to force through a technique if it is not comprehensible to the personnel involved, or if there is insufficient information available for it to be meaningful. Similarly, performing a review requiring detailed drawings at a project stage where only sketches are available will prove frustrating.

Involving the right people

The majority of hazard identification techniques rely on some form of group consensus reached in a workshop and are a product of the experience, knowledge and agendas of those involved. Failure to have suitably experienced personnel in the room can result in hazards being missed or incorrect information being recorded, though having an experienced but insular group of personnel can also mean that existing arrangements remain unchallenged.

Having the right mindset

Although we must be mindful of historical events as a guide to what can happen, it is also important to keep an open mind and 'think outside the box' in terms of what might happen. Simply because a specific accident hasn't happened before does not mean that it can't happen.

Summary

Hazard identification is the first step of the risk assessment process and a hazard missed is a hazard uncontrolled. There are many tools and techniques available, but no 'one size fits all'. The key to successful identification lies in choosing the right tool for the job, involving the right people and being prepared to challenge the status quo.

It is also worth remembering that hazard identification is a continual process; designs evolve, conditions change, processes move on – all operations require periodic revalidation of the hazards present.

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References

1. Five Steps to Risk Assessment, UK Health and Safety Executive
2. Tools & Techniques for Hazard Identification and Risk Assessment, ISO 17776:2000
3. Risk Management, ISO 31000:2009

Further Reading

1. Hazard Identification Methods, European Process Safety Centre
2. Review of Hazard Identification Techniques HSL/2005/58, UK Health and Safety Laboratory

An Introduction to Behavioural Safety
How to get the best out of people

Have you ever wondered why people do what they do? Is there a way to influence the way people behave so that the job gets completed in the most efficient, productive and safe manner? In the discipline of behavioural safety, the most effective way to achieve this is to understand the underlying reasons for people's outwardly expressed behaviour and to give them an informed choice in the workplace.

Defining behaviour

Human behaviour is the only output that indicates what an individual's inner values and attitudes might be. Human behaviours are the collection of motor actions, verbal statements, facial expressions and body language that we each use to express ourselves and to undertake social and work related activities each day. Our behaviour and its underlying drivers develop over time as a product of our biological make-up, our varying cultural influences, our life experiences and the associated memories and learning. These act as filters, through which we perceive the external world, enabling rapid thought ('cognitive') processing and accurate, fast motor responses.

Unfortunately, these filters also cause us to view the world in a biased way, one that is based purely on our own experience and which may not naturally consider the 'bigger picture' nor detect subtle but crucial changes in sensory input. This can therefore lead to inaccuracies, false conclusions and inappropriate behavioural outputs, such as ignoring the early warning signs of potential accidents.

In the mood

Behaviours are also motivated and directed in the short and long term by many additional internal and external factors. These include mood, interest and stimulation level, personally experienced and vicariously learnt consequences for actions, organisational cultural influences, relationships with colleagues, aspects of a specific task, the working environment and organisational structure.

As a consequence, there is potential for a wide range of possible behaviours by an individual for any given situation. This has the advantage of fostering original action and use of initiative, which can improve problem solving and increase work capacity. However, there can also be an increased potential for human error and associated losses.

Behavioural safety approach

An individual's filters and associated behavioural outputs are learnt and as such can change. Indeed, many of the influencing factors within the workplace can also be changed.

As such, developing a cohesive and planned collection of corporate and personal activities, structures and processes which explicitly considers the individual and what is driving and influencing their behaviour is increasingly recognised as an effective approach for safety improvement [see Box 1].

Ideally, behavioural safety activities should target all levels throughout an organisation, albeit in a tailored way. A disproportionate emphasis on 'front line' staff may not address why a person is behaving in a certain way. Effective behavioural safety programmes should make appropriate changes throughout the business, based on the identification of underlying causes.

Staff input and buy-in, trust and communication are key if an organisation wishes to move from a 'blame' culture towards a 'just' culture and make real safety improvements. Competency development must be included, together with mentoring and empowerment, so that people can make informed choices and work together with a clear sense of responsibility for their own actions and a belief in the organisation.

Conclusion

If an organisation wishes to make a step change in safety performance, a bespoke behavioural safety programme may well be part of the solution. The key to getting the best out of an organisation as a whole is to harness its collective expertise and potential and get the best out of its people.

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Box 1 – Behavioural safety activities

- Safety culture/climate assessment
- Behavioural safety training, workshops and coaching
- Management of change
- Leadership development
- Competency management
- Leading performance indicators
- Effective human factors
- Incident root cause analysis
- Procedural improvement

Nuclear Training for the New World

NRC File Photo

Nuclear renaissance

In a remarkably short space of time public perception of nuclear power generation has been transformed from a mistrusted, legacy 'sunset' industry to one with a central role in the energy policy of many countries. Key factors have been increased recognition of:

- Global warming and the effect of CO2 emissions
- The need for energy security

Encouraged by this rapid renaissance, many countries are mobilising resources and planning for 'new build'. Those with an existing nuclear industry are finding it a challenge to assess the designs offered by the international vendors and plan for the construction and operation of new plants.

Those countries which are embarking on nuclear power generation for the first time face even greater challenges. There are a number of prerequisites laid down by the IAEA [Ref 1], including:

- Recognition and acceptance of the responsibilities and commitment associated with nuclear power generation
- Adopting international legal instruments
- Establishing the necessary national legal framework
- Creating an independent regulatory body

Emerging nuclear nations

Upwards of 60 countries have expressed some level of interest in establishing a nuclear power programme. Of these 35 are new to nuclear power generation [Ref 2].

After the policy decision to launch a nuclear power programme has been made in these nations, an essential element of the preparatory work is to establish an independent nuclear regulator with responsibility for:

- Setting up nuclear regulations
- Issuing licences
- Carrying out independent safety assessments
- Implementing an inspection and control regime
- Establishing frameworks for protection and emergency preparedness
- Determining penalties for breaches

Of particular importance is the recruitment and development of people to ensure and maintain a competent and effective regulator. This presents a notable challenge for a nation with little or no national nuclear expertise and experience.

A credible approach is to recruit an experienced regulatory resource from the international community. This would rapidly establish a competent capability, supporting steady progress towards procuring and operating the first nuclear power plant.

In parallel with this, a longer term local development plan is also needed with the aim of developing a highly capable and mature regulatory organisation with a high proportion of national personnel. This would ensure that effective regulation can be maintained throughout the life of the nuclear power programme.

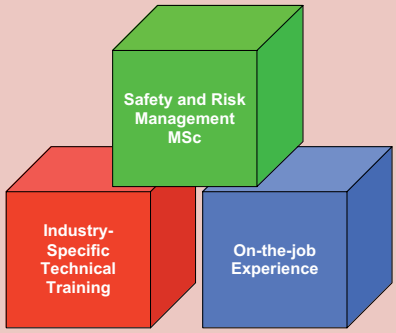
In support of the development of such local regulatory expertise, Risktec has worked closely with an international regulator to tailor the Risktec Safety and Risk Management MSc programme to meet the specific requirements of a nuclear regulatory body.

This has led to the development of a number of additional foundation and specialist modules on nuclear and regulatory topics. The key features of this training and education programme are summarised in Box 1.

Box 1 – Nuclear training and education programme

The programme is based around 3 main building blocks and is designed to deliver:

- A fast-track route into the nuclear industry
- Relevant post-graduate qualification
- Practical insights to the nuclear industry



MSc programme

Core modules from the Risktec MSc programme were selected and customised to meet the specific needs of our client. This included increasing the nuclear content of the core modules and emphasising the regulatory role in the nuclear industry.

Specific training

A number of specific modules were developed to cover topics on nuclear reactors and nuclear regulation. Although outside the formal MSc qualifications, students are assessed to the same standard as the MSc.

On-the-job experience

Students gain experience during periods of time spent in their workplace. In addition, during their study periods they attend specific nuclear industry events, visit operating nuclear facilities and have specialist workshops with industry experts.

Conclusion

The challenges faced by countries seeking to harness nuclear energy for the first time are considerable and require long-term commitments. At the heart of any successful programme of this scale is competent people. Whilst international expertise can assist, the development of local expertise is essential for long-term success.

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