

## Introducing Risktec Solutions Limited



Andre ter Weele,  
Risktec Director

**Welcome to the first issue of our company newsletter.**

Risktec Solutions Limited surged on to the industrial scene in September 2001, and is now carrying out multiple consulting contracts with blue-chip clients.

Specialising in high-risk sectors, such as nuclear and defence, oil and gas, chemical, defence, rail, marine and major corporations, Risktec offers services in three business streams - safety and risk

assessment, business risk management and advanced risk engineering.

A subsidiary of Nutec Centre for Safety Ltd, the UK safety and survival training wing of Nutec Global, Risktec's launch mirrors a similar move into risk management by Nutec Global, in the Netherlands.

"Each year, tens of thousands of professionals operating in some of the world's most hazardous workplaces come to Nutec's centres for training to safeguard

not just their livelihoods but their very lives," said Risktec Director Andre ter Weele.

"We are therefore -uniquely placed to help employers manage risk not only to their employees - arguably their most valuable asset - but also to help to assess, manage and where possible eliminate many of the risks associated with the business's other assets, such as equipment, materials and processes."

Risktec's head office is in Warrington, Cheshire, but,

reflecting an increasing involvement in the oil and gas and petro-chemical industries, also operates from Nutec's centres in Teesside and Aberdeen.

Its clients are predominantly UK-based, but already the nature of Risktec's expertise has secured contracts all around the world - and in some of the harshest environments imaginable.

## A UNITED COLD FRONT

**Risktec helps to solve problems in some of the world's extreme environments**

**Centre pages**



**Reflections:** "Considering that we only started full operations in September 2001, the positive response from the markets to our service has been very pleasing," Andre ter Weele reflected. "Clients across major hazard and high asset value sectors have been very supportive of our approach - which is to focus on providing solutions, not more problems - and they like the blend of 'can do' attitude and professionalism." There are now 28 people in Risktec in the UK, organised in flexible project teams. "They are all very high calibre and motivated, and everyone has made a great contribution to making Risktec happen over the past eight months," Andre emphasised.

## Astute beginnings for Risktec



Risktec is taking part in a prestigious project to prepare Nuclear Safety Cases for the Royal Navy's next generation of nuclear submarines.

The Astute class hunter-killer, the biggest and most powerful attack submarine to be built for the Royal Navy, will replace Swiftsure Class submarines at the heart of the UK's naval fleet. Significantly, the Astute will be the first Royal Navy submarine to be covered by a modern standards whole boat safety case.

Risktec is assisting in nuclear safety case preparation for Rolls Royce Naval Marine, which is designing the reactor plant, and BAE SYSTEMS Marine, at whose shipyard at Barrow-in-Furness, Cumbria, the first stages of construction are now proceeding.

Steve Pearson, project manager for Risktec, said: "The Astute is a challenging project and very much a project of the future. We are proud to play a part in the development of such a seminal safety case."

## Early industry plaudit

Risktec was awarded BS EN ISO 9001:2000 accreditation for its quality management system within three months of starting operations.

Quality Assurance Manager Mel Davies explained: "If we are going to go to industry and say this is the best practice you should adopt to manage safety and business risk, we have to be seen in every respect to be practising what we preach."

The system covers all aspects of the business, from sales and marketing, to finance and business development, to health, safety and environmental, and IT support. "We have a true business management system, not just a project quality assurance system," Mel emphasised.

## Tripod software success

Risktec Consulting BV, Risktec's Dutch sister (previously called Advi-Safe), has been awarded a contract by the Stichting Tripod Foundation to develop and support the Tripod-Beta incident analysis software. Tripod-Beta is used to conduct analysis of an incident to enable investigators to confirm facts and identify the underlying causes. The underpinning Tripod methodology is based on the renowned incident causation research carried out by Manchester and Leiden Universities. Risktec will market and sell Tripod-Beta and provide expert consulting and training in its use.

# Risk recognition keeps industry safely wrapped up against the cold

Risktec Solutions Limited is bringing its consultancy expertise to bear in some of the planet's harshest environments.

The company has won contracts providing HSE (Health, Safety and the Environment) Cases in two areas of the world – Sakhalin, off the east coast of Russia, and Kazakhstan's sector of the Caspian Sea – where plummeting winter temperatures spell a potential hazard to both employee and business.

Each location places major hazardous industries in areas of outstanding natural beauty and extreme environmental sensitivity.

Risktec Consultant Andy Lidstone said: "An HSE Case is designed to ensure operations are carried out without endangering personnel, the environment, the asset or the company's reputation. By observing and assessing a number of industrial installations in areas of extreme climatic change, we have gained a body of knowledge of potentially hazardous effects of extreme cold on operations and employees.

"For instance, there are limits for when you can and cannot use cranes due to the weakening effect on steel of freezing temperatures, while people working at temperatures below -40°C, even with full PPE, will perhaps have a 20 to 30-minute work window before they need to go to a heated shelter."

## Sakhalin Island

The breathtaking beauty of Sakhalin's north island, with its mountains, miles of silver birch forests, and coastal waters extraordinarily rich in sealife, masks a hostile climate. The island, in a corner of the Sea of Okhotsk, is snow-covered from December until May. The north-east of the island, where the Vityaz complex is located, is ice-bound for most of this period and temperatures can fall to below -30°C.

Vityaz, which is made up of the Molikpaq drilling and production platform and Okha FSO (Floating Storage Offloading vessel), is



operated by the Sakhalin Energy Investment Company (SEIC).

Last year, it produced 15 million barrels of crude oil and is Russia's first offshore facility to supply crude to the international market. SEIC plans to expand the operation to three platforms, supplying crude oil and liquefied natural gas all-year-round from an ice-free port on Sakhalin's south island.

Risktec is preparing an HSE Case for the operation and support of the Vityaz complex, including interfacing with an accommodation platform during construction work.

Risktec consultant Rob Steer said: "The proposed development of oil and gas fields off the coast of Sakhalin presents significant technical challenges. Managing the risk to the environment is very

Above, Okha FSO at anchor in the frozen Sea of Okhotsk, off Sakhalin Island. The front cover shows the Molikpaq production platform. Left, the artificial island enabling drilling by KCA Deutag in the Caspian Sea.

important. The sea is rich with marine life, notably salmon, and is a summer feeding ground for western grey whales. The complex must operate to high HSE standards for the safety and health of company and contractor employees and the protection of the environment.

"The climate is a major consideration all-year-round. In the winter, ice formed in an 'ice kitchen' to the north of the Complex flows down the eastern side of the island, surrounding the Molikpaq in flowing ice. The FSO has to leave the area during the winter.

"The area is very remote, and logistics for getting equipment to Vityaz are complex. Equipment from off the island is brought into

Korsakov, the island's southernmost port, and is then transferred by road to Kholmsk, on the eastern seaboard. A further three-day sea journey in a supply vessel with ice-breaking capabilities then follows."

## Caspian Sea

Agip Kazakhstan North Caspian Operating Company (Agip KCO), operator of the Kashagan development on behalf of a consortium of international companies; Eni's Agip Caspian Sea, BP, BG Group, ExxonMobil, Inpex, Phillips, Shell, Statoil and TotalFinaElf, has constructed a 150 metre by 100 metre artificial island in the Kazakhstan-owned north-east corner of the Caspian Sea, for a land-based oil and gas drilling operation by drilling contractor KCA Deutag.

The Caspian Sea's very shallow waters, only four metres around the island, ruled out traditional floating or jack-up offshore drilling rigs - and also presented Risktec with a challenging job in helping to assess the potential risks in the operation and

ensuring the right controls and recovery measures are in place.

The HSE Case took account of the environmentally sensitive ecosystem of that corner of the Caspian Sea, which is home to a high percentage of the world's sturgeon population – probably the most important natural resource of the region – and is subject to zero discharge regulations.

Once again, temperatures as high as +40°C in summer and as low as -30°C in winter became major operational and safety considerations. In winter, the sea around the island freezes and the wind can move the ice sheets at speeds up to five knots, building ice rubble mounds six-metres high in less than 24 hours and requiring pro-active ice-management procedures.

Consultant Ian Woodward said: "The HSE Case and Safety Operations Plan we helped prepare covered specifically the drilling of wells and well testing. Using local knowledge of wind direction and ice flow patterns several scenarios were developed for emergency evacuation in the unlikely event of a hydrogen sulphide gas release. There are three designed Arktos vehicles, a Canadian designed motorised amphibious people carrier, which would move cross-wind across a mixture of water and ice to evacuate personnel. This requires the vehicles' drivers to be highly trained and skilled."

Risktec consultants have successfully completed HSE Cases for drilling rigs, logistics/supply bases, offshore production platforms, onshore terminals, pipelines, gathering stations, marine vessels, chemical facilities, gas plant and distribution, refinery units and mines.

Andy Lidstone added: "We base solutions on understanding the client's business and the issues it faces, and the best way to do this often involves putting on your warmest clothing and seeing – and feeling – for yourself just what those issues are."

## Choice questions

### Deterministic or probabilistic analysis?

The goal of safety assessment is to demonstrate that the risk associated with the construction, operation or decommissioning of any facility is at an acceptable level. One of the questions that people sometimes ask is, "which analysis techniques should be used to determine whether this goal is achieved?"

In essence, there are two main types of analysis which could be used:

**Deterministic Analysis**, which aims to demonstrate that a facility is tolerant to identified faults/hazards that are within the "design basis", thereby defining the limits of safe operation.

**Probabilistic Analysis**, which aims to provide a realistic estimate of the risk presented by the facility. This can also be used to confirm the validity of the deterministic safety assessment.

### PROS AND CONS OF THE APPLICATIONS

	Qualitative or Deterministic	Probabilistic
Hazard/Initiating Event	<ul style="list-style-type: none"> <li>Limited to consideration of relatively frequent events, commonly called "Design Basis accidents".</li> </ul>	<ul style="list-style-type: none"> <li>All potential credible accidents are included</li> </ul>
Analysis Method	<ul style="list-style-type: none"> <li>Utilises conservative rules, standards and guidelines</li> <li>Arguments may use a variety of techniques, including engineering judgement, factors of safety, incredibility of failure arguments, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Arguments follow a well established methodology</li> <li>Best estimate assumptions</li> </ul>
Common Cause Failure	<ul style="list-style-type: none"> <li>Not normally assessed in detail</li> </ul>	<ul style="list-style-type: none"> <li>Multiple and Common Cause Failures easily assessed</li> </ul>
Design	<ul style="list-style-type: none"> <li>Able to support the design process.</li> </ul>	<ul style="list-style-type: none"> <li>A design concept is required and probabilistic analysis is unlikely to be available in time to support the detailed design phase.</li> <li>Aids in identifying cost effective safety improvements to existing facilities</li> </ul>
Results	<ul style="list-style-type: none"> <li>Compliance with the rules, standards and guidelines infers a safe facility</li> <li>Does not determine residual risk</li> </ul>	<ul style="list-style-type: none"> <li>The risk from the facility may be determined</li> <li>Allows the targeting of maintenance</li> </ul>
Cost/Time	<ul style="list-style-type: none"> <li>Relatively quick and economical</li> </ul>	<ul style="list-style-type: none"> <li>May be time consuming especially if full PSA /QRA is used</li> </ul>

In practice, modern safety assessments tend to make use of both deterministic and probabilistic techniques because of their complementary approaches.

### Further Reading

Engineering Safety Management, Volumes 1 & 2, Fundamentals and Guidance, Issue 3, Railtrack, January 2000.

UK Offshore Operations Association, Industry Guidelines of a Framework for Risk Related Decision Support, Issue 1, April 1999.

HSE, Safety Assessment Principles for Nuclear Plants.

Reducing Risks, Protecting People, HSE's Decision-Making Process, 2001.



## Risktec applies REPPIR to radiation emergency planning

Risktec Solutions is working with a number of nuclear industry clients, both in the civil and military sectors, to apply REPPIR – the Radiation (Emergency Preparedness and Public Information) Regulations – to existing plans for coping with an offsite radiation emergency.

The legislation, which came into effect in September 2001, complements existing requirements for contingency planning (IRR99).

Its application is based on the quantities of radioactive substances involved in work, process or transportation, and consideration of "reasonably foreseeable" incidents that could result in a significant release of radiation off-site.

The definition of "reasonably foreseeable" and the specification of a "radiation emergency" in terms of off-site dose uptake has effectively required the re-examination of the hazard identification and risk evaluation,

and therefore emergency planning, for a great many nuclear licensed sites.

It also redefines the general requirement on local authorities to provide information to the public in the event of a radiation emergency.

"REPPIR was intended to have minimal impact, but was designed to formalise current emergency arrangements for establishments handling radioactive materials and make them consistent with emergency

arrangements for other hazardous materials industries," said Greg Davidson, of Risktec.

"We are helping a number of clients to revisit their emergency plans and public information procedures, and to re-assess in detail emergency scenarios where there is potential risk of an offsite release of radiation.

"Whilst most nuclear installations already have a quantified risk assessment, relating to this what is 'reasonably foreseeable' generated some debate."

## DID YOU KNOW? Some facts about Nutec Global

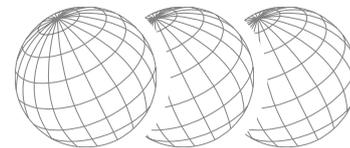
- Nutec Global is the world's largest provider of safety and emergency response training services.
- The organisation has about 20 consulting offices and training centres, and more than 275 people around the world
- The group has training centres in The Netherlands, Norway, Ireland, the Middle East and Malaysia, as

- well as in England and Scotland.
- Centres offer 75 different basic courses, in each case satisfying the approval standards of the appropriate regulating authority
- Operating in the UK since 1994, Nutec has internationally-recognised centres for excellence in workplace safety at Teesside and Aberdeen, where

- more than 40,000 people a year receive industry-accredited training across six industry sectors offshore, maritime, aviation, military, onshore industrial and medical services
- Nutec Global's consulting activities not only provide risk management services (Risktec), they also provide crisis management services

- (Nutec Crisis Management) on an international scale, both to industry and the public sector.
- IT applications division Planet Nutec is scheduled to become a Microsoft Gold Certified Partner for software development later this year, a certification typically reserved for Hewlett-Packard sized companies.

# Demonstrating how hazards are being properly managed



Many large companies operating hazardous facilities are required either by law or by their own corporate standards to demonstrate that the health, safety and environmental hazards associated with their operations are being properly managed.

This typically means they need to conduct a formal risk assessment, demonstrating that the controls are in place for a hazard at a particular moment in time, together with a separate description of the system for ongoing management control.

What is invariably missing is the direct and visible link between the controls as they are today, and the procedures and people responsible for ensuring they will continue to be effective tomorrow.

Risktec consultants are pioneers in the use of the "bow-tie" methodology to overcome this problem.

The bow-tie diagram is an extremely powerful representation of risk control and lends itself very well to hazard management.

By visually displaying the hazard, its causes and consequences, and the controls to minimise the risk, the bow-tie can be readily understood at all levels in an organisation, from senior managers to operations personnel.

Critical tasks which establish or maintain these controls are identified. Responsibilities for their execution and supervision are then assigned to positions in the organisation. It is these steps that demonstrate how the organisation's management system ensures the ongoing management of hazards.

## Assessing Risk

The key to any formal risk assessment is to identify the hazards arising from operations and the threats leading to the hazard. The risk exposure is predicted by defining the resulting impact on the business, combined with the likelihood of the impact occurring.

An example of a user-friendly risk assessment matrix is shown in **Fig 1** and may be used at the outset to qualitatively assess the people, asset, environment and reputation risks. By avoiding probabilistic terms, such as  $10^{-4}$  -  $10^{-3}$  per year, the risk matrix is more widely understood.

## The Bow-Tie

At this point, the "bow-tie" diagram

Hazard	CONSEQUENCE				LABELLING				
	Task	Asset	Personnel	Threat	A	B	C	D	E
1	High	High	High	High	Manage for continuous improvement				
2	High	High	High	High	Manage for continuous improvement				
3	High	High	High	High	Manage for continuous improvement				
4	High	High	High	High	Manage for continuous improvement				
5	High	High	High	High	Manage for continuous improvement				
6	High	High	High	High	Manage for continuous improvement				
7	High	High	High	High	Manage for continuous improvement				
8	High	High	High	High	Manage for continuous improvement				

Fig 1

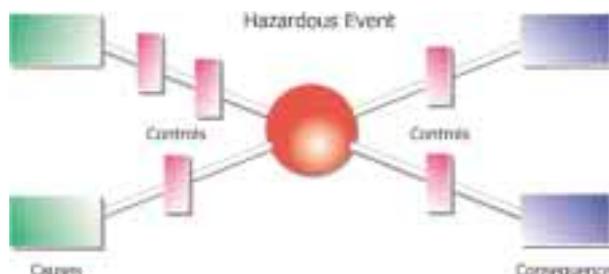


Fig 2



Fig 3

may be introduced (**Fig 2**). The left side of the bow-tie highlights the controls which prevent each cause of the hazardous event at the centre of the bow-tie. On the right side, similarly, are controls which mitigate against progression of the event to the worst case consequences.

Facilitated workshops involving people who are confronted with the hazard on a regular basis, supported by specialist technical advisers, have been found to be very effective at identifying the real controls and capturing current operational practice.

A major spin-off benefit of the workshops is that they stimulate communication between key stakeholders, whether from the company, contractors or external parties, who all have a role to play in managing a hazard.

"We found that involving our operational people in a field that has traditionally been fairly

academic, really encouraged ownership of the process and certainly produced better results," said Steve Cooper, Director of HSE at BOC Gases.

## Critical Tasks

Identifying the controls is insufficient in itself. The risk assessment is "static"; in other words it presents a snapshot of the controls at that moment in time only. So, to ensure that the controls will still be effective tomorrow, links are made to those "critical tasks" which put in place or maintain a control in the bow-tie diagram, as shown in **Fig 3**.

The tasks may be inspection, operational, maintenance or administrative. It is only by the timely performance of such tasks that an organisation can be assured that risks are being managed properly.

To "energise" the assessment and make sure that risk

management becomes a real part of line management activity, it is essential to specify:

- who is responsible for each critical task
- competencies needed to ensure the task is carried out properly
- the procedure where the task is defined
- how it will be verified that the task has been undertaken properly, and at what interval

## Balancing Controls

Ideally, the cost of controls should not exceed their potential benefit. However, quantitative measurement of the true costs and benefits is often difficult. The ultimate decision on the level of control usually rests with the line manager, who would be responsible in the event of a loss, and is typically reached by consensus of the group confronted by the risk.

While the management of risk often requires a thorough overlay of checks, there is need to ensure controls do not become restrictive and lead to excessive bureaucracy.

Indeed, the challenge within many companies is likely to be judging what controls continue to be necessary as more streamlined and flexible plant operating philosophies are introduced.

## Benefits of Approach

Widespread application across hazardous industries suggests that the success of the bow-tie approach can be attributed to:

- Recognition that effective risk management is only possible if people are assigned responsibilities for controls.
- The user friendly, graphical illustration of how hazards are controlled is readily understood at all levels in the organisation.
- Workshops which improve understanding of the risks and encourage ownership of the operational hazards.
- A formal methodology for demonstrating the highest standards of hazard management.
- Focusing on the practical implementation of the hazard management process at the operational level, so that it can be readily audited by corporate functions or regulators.
- Demonstrating not only what controls are in place, but why they will still be there tomorrow.

For further information, contact Risktec Solutions at: **Email** - enquiries@risktec.co.uk

**Website** - www.risktec.co.uk

**UK Principal Office**  
Wilderspool Park  
Greenall's Avenue  
Warrington  
WA4 6HL  
Tel +44 (0)1925 438010  
Fax +44 (0)1925 438011

**Aberdeen Office**  
Riverside House  
Riverside Drive  
Aberdeen  
AB11 7LH  
Tel +44 (0)1224 224454  
Fax +44 (0)1224 224455

**Teesside Office**  
Haverton Hill Industrial  
Estate, Billingham  
Stockton-on-Tees  
TS23 1PZ  
Tel +44 (0)1642 566656  
Fax +44 (0)1642 563224

**Nutec Group Principal Office**  
Westplein 5a  
3016 BM  
Rotterdam  
The Netherlands  
Tel +31 104 362 030  
Fax +31 104 360 445