Taking the ghost out of the machine

The refining and chemical process industries have been rocked by some widely publicised incidents in recent times. To help reduce the number of accidents, DNV uses a risk-based approach through the isrs7 tool. TEXT: ROSIE COLLYER

Londoners held their breath last November as all the major news channels showed images of 30-metre-high flames bursting out of the isomerisation tower at Petroplus' Coryton refinery. Miraculously no one was killed or injured, but the public was once again made aware of the risks associated with the refining and chemical processing industries.

THE ADAPTATION OF THE ISRS7 TOOL TO ENCOMPASS PROCESS SAFETY MANAGEMENT ENABLES THE CONSIDERATION OF SPECIFIC CONTROLS NEEDED FOR MANAGING PROCESS SAFETY RELATED EVENTS.

A UK Health and Safety Executive investigation is still ongoing at the Coryton Refinery. Yet leading refiners remain uninformed about the extent to which risk affects the industry as a whole:

"They (refiners) have generally only been interested in their own pool of refineries in terms of safety. But when they look at the industry as a whole, it is usually in terms of margins or the future of refining, but they don't tend to be focused as an industry on their safety record, and it is the focus on safety that DNV is bringing to the industry," says Hari Vamadevan, DNV Energy's director of operations in Europe and North Africa.

Since January 2005, DNV has been recording major incidents and accidents in the refining and chemical process industries that are in the public domain. Over 1,800 incidents have been recorded thus far, and 45 lives were lost in 2008 alone.

Lessons learned

When the media spotlight is redirected elsewhere and the New Risk Reality seems less real, the fact still remains that most refineries and chemical processing plants in Europe and the US run assets that are over 30 years old. The conventional view of industry decision makers has been to pour money into asset optimisation programmes.

The Baker Report commissioned following the 2005 blast at BP's Texas City refinery that killed 15 and injured 180, suggested that improvements in safety management systems and corporate culture were needed to manage major accident risks.

"Management systems designed primarily for occupational safety issues rarely perform well in managing major accident hazard potential. A detailed risk-based process safety management programme is a necessary foundation to prevent major accidents," warns Graham Bennett, director of Refining and Petrochemicals in DNV Energy.

The industry is at last warming to the idea that an integrated approach to Safety, Health and Environment and asset management is needed in order to achieve the necessary process safety improvements.

" Plants operating in the US and the EU have definitely advanced in terms of personnel safety improvements, and some basic process safety initiatives have been implemented via OSHA 1910 in the US. And most promising of all: last year the Center for Chemical Process Safety, a US-based corporate membership organisation, committed itself to a series of Process Safety Management related initiatives," explains Graham Bennett.

Prevention is better than cure

By mid-2006, DNV Energy responded to growing industry demand by launching the isrs7 Process Safety Management tool. Designed to assess the status of the multiple layers of hazard management protection, isrs7 uses a structure of 15 processes with the aim of stimulating continual improvement within an integrated management system (see fact box). The approach also allows benchmarking Process Safety Management performance, which is of particular interest in an industry with multiple stakeholders.

DNV has undertaken a number of Process Safety Management implementation projects, using the isrs7 tool. OMV, Austria's largest listed industrial company with over 40,000 employees, turned to DNV for help in 2006 after a number of incidents occurred at two of their oil refineries. Some of the incidents highlighted the major loss potential; and although no injuries were caused, OMV was keen to maintain its good safety record.

"We undertook a Root Cause Analysis of a number of the incidents to identify the systemic causes. The review of systemic causes highlighted the need to develop a new approach to Process Safety Management, which is being led by the newly formed OMV Centre of Excellence," explains Graham Bennett.

Atom and evil

While the refining and chemical processing industries have been dealing with the New Risk Reality in recent years, the nuclear industry has been battling with risk-related myths since its inception.

Sellafield on the east coast of Great Britain has been a hotbed of public debate since it opened in the 1950s. As

DNV has observed and participated in several regulatory and engineering approaches aimed at reducing major accident risks over the past decade.

Europe's largest industrial site it is home to over 200 nuclear facilities, including two reprocessing works and a plant for making mixed uranium and plutonium fuel called Mox. It is currently undergoing decommissioning, a process that requires optimum management effectiveness as well as the highest possible understanding of health and safety issues.

In 2005, DNV was awarded a contract by the British Nuclear Group to provide isrs7 related services at its Sellafield site. DNV undertook an initial isrs7 (Alpha) Assessment of 1,200 people in the Environment, Health, Safety & Quality (EHS&Q) department at Sellafield. This evaluation identified a number of issues concerning the effectiveness and understanding of the systems in place for managing EHS&Q risks.

"Following the success of this project, DNV was appointed to map and assist with the implementation of a knowledge management (KM) programme at the Sellafield nuclear services site. DNV's role is to help shape the company's knowledge management strategy and to train the Sellafield KM team in a range of KM practices," says Eric Pape, Head of DNV Utilities in the UK.

On the other side of the Atlantic, public opinion on nuclear energy has thawed since the Three Mile Island accident in the 1979 in which radioactivity was spread across the countryside after a fire broke out in a reactor chimney. Insufficient of information from the owners about the severity of the incident exacerbated public anxiety. The media then filled the information gap with mixed results. USA eased building additional nuclear power stations in the aftermath of the accident, and has only very recently begun entertaining the possibility of reviewing that stance.

In 2006, President Bush announced an "Advanced Energy Initiative" that involves investing more in zero-emission coal-fired plants; revolutionary solar and wind technologies; and clean, safe nuclear energy. So the need for Process Safety Management systems looks set to increase in the refining, chemical processing and the nuclear industries.

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ISRS7 PROCESSES

The tool is comprehensive and detailed. The processes include:

1. Leadership
2. Planning and Organisation
3. Risk Evaluation
4. Human Resources
5. Compliance Assurance
6. Project Management
7. Training and competence
8. Communication and promotion
9. Risk Control
10. Asset Management
11. Contractor Management and Purchasing
12. Emergency Preparedness
13. Learning from events
14. Risk Monitoring
15. Results and review