INCREASING EXECUTIVE & BOARD UNDERSTANDING OF PROCESS SAFETY

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INTRODUCTION

Incidents such as the explosions at BP's Texas City refinery and Buncefield as well as the more recent Deepwater Horizon have increased media and public awareness of weaknesses in process safety and the potential for injuries, deaths, material damage and severe environmental impact. The most recent of these, the fatalities and environmental damage from the BP drilling rig in the Gulf has also demonstrated the magnitude of the potential financial losses, over $20 billion at the time of writing, as well as the effects on the company's market capitalisation, a fall of over 50% over three months. At one point this also brought into question the future of BP as an independent company. There is no doubt that these events have increased the focus on process safety at board level, clarified that a concentration on personal safety alone is not enough and demonstrated the need for greater Board awareness and involvement in process safety. This paper will describe an initiative by the IChemE to increase executive and board understanding of process safety.

INSTITUTION OF CHEMICAL ENGINEERS INITIATIVE

In 2007, as a response to the incidents at Texas City (Ref 1) and Buncefield (Ref 2) the Institution of Chemical Engineers (IChemE) established a working party which resulted in the development of a training programme, 'Fundamentals of Process Safety' (Ref 3). This one week course was targeted at providing engineers and managers working in the process industries with a broad understanding of process safety in order to help them to fulfil their roles as well as providing a basis for more specialist training. The course has been very successful with a new version developed for those working in the nuclear sector, a sector which is expected to grow significantly over the next ten years. During the development of the 'nuclear' course the need to increase the understanding of process safety by executives and board members was highlighted by one of the authors of this paper, A Brandwood, a nonexecutive director at Energy Solutions, and a course structure was developed and agreed by members of the IChemE working party.

This paper will describe the aims of this course, the outline structure and the experienced gained in delivery to the boards of two companies working in the nuclear sector.

BOARD RESPONSIBILITY

As noted above failings in process safety can have a major impact on a company's reputation and market valuation. The board's responsibility is clearly identified in the UK's Corporate Manslaughter legislation as well as the Turnball report into Corporate Governance (Ref 4) which states:

> *'It is the role of management to implement board policies on risk and control. In fulfilling its responsibilities, management should identify and evaluate the risks faced by the company for consideration by the board and design, operate and monitor a suitable system of internal control which implements the policies adopted by the board.'*

COURSE AIMS

Following the explosions & fire at its Texas City refinery BP initiated an independent investigation into its refinery operations in the USA, the Baker Panel. The report of this panel (Ref 1) identified the importance of an understanding of process safety throughout an organisation, recommendation 3 of the Report stating:

> *'BP should develop and implement a system to ensure that its executive management, its refining line management above refinery level and all US reefing personnel possess an appropriate level of process safety knowledge and expertise'.*

Clearly this requirement is not restricted to BP.

Whilst it would be possible to develop an executive course which concentrated solely on improving the understanding of process safety it was decided from the outset that it was important that the time of board members was used to ensure not only an improved understanding of the risks associated with the operations of the enterprise but also to provide an opportunity to develop actions which would improve process safety throughout the organization. In order to achieve these it was concluded that the most effective approach would be to bring all the board members together in order to enhance the safety assurance of the businesses by:

- developing the board's understanding of the principles of process safety management, of human factors and how the safety culture affects performance;

- ensuring board awareness of the process safety hazards of the business and of their role in managing these hazards;
- identifying the methods used to inform the board of the status of process safety across the company;
- exploring how the board's commitment to process safety is disseminated throughout the company and by the contractors employed in its operations.

It also became clear that providing the board with an opportunity to share perceptions and discuss the potential impact of different courses of action created a better team understanding of the issues they face.

FAILINGS IN RECENT INCIDENTS

Before looking at the course it is important to understand the way in which failings at board level have contributed to recent incidents. Whilst, at the time of writing, details of the management failings which contributed to Buncefield and Deepwater Horizon have still to be made available other reports, such as those into the 1998 explosion at Longford (Ref 5) and the US Chemical Safety Board investigation into Texas City as well as the Baker Panel are available. In addition an independent inquiry has recently been completed into the loss of a Royal Air Force Nimrod over Afghanistan in (Ref 6). All of the above investigations identified technical and operational failings which contributed to the event. However a strong common theme was the corporate failings in leadership, safety culture and auditing, these are typified by the title for the report into the Nimrod disaster *'A Failure of Leadership, Culture and Priorities'*.

Over the past 20 or 30 years we have seen major developments in the methods used to identify hazards, to assess their impact, to develop and implement comprehensive management systems as well as improved regulations. Whilst these developments have been important in the delivery of sound performance there has been limited concentration on the roles and responsibility of the board and senior executives.

LONGFORD

The official inquiry into the fires & explosions at Esso's Longford plant noted that the audits carried out by Esso prior to the incident failed to highlight many of the weaknesses. These included a failure to carry out a HAZOP on the facility, a study which, if properly conducted, would have identified the weaknesses leading to the incident. To quote the official report's finding on the Esso audit, 'it . . . *can only be concluded that the methodology employed by the assessment team was flawed.'* In addition the Royal Commission was scathing of Esso's safety management system (OIMS) '. . . *there was a tendency for the administration of OIMS to take on a life of its own, divorced from operations in the field. Indeed it seemed that in some respects, concentrating upon the development and maintenance of the system diverted attention away from what was actually happening in the practical functioning of the plants'*. Failing of this type can only be corrected by board and by top management. In addition in discussing the impact of safety culture on the event Hopkins (Ref 5) highlights the over-riding importance of the management culture. '*What is required is a management mindset that every major hazard will be identified and controlled and a management commitment to make available whatever resources are necessary to ensure that the workplace is safe'*.

TEXAS CITY

The Chemical Safety Board's (CSB) investigation into the explosion at Texas City identified many generic factors which applied across the site including lax supervision and shift changeover and a failure to implement improvements in process safety due to cost pressures on the site, including measures which would have prevented the incident. These were not consistent with the BP corporate safety policy which stated that '*Everybody who works for BP, anywhere is responsible for getting HSE right. Good HSE performance is critical to the success of our business'*. The fact that the failings were so widespread at the site must cast serious doubt on the mechanisms used by the board to verify the effectiveness with which process safety was being managed.

In addition to the CSB investigation into Texas City and the prosecutions by OSHA, BP established an independent panel under James A Baker to carry out a review of its refinery operations in the USA. In its comments on 'Corporate Oversight' the report notes that

> '*BP's executive management either did not receive . . . . information that suggested process safety deficiencies. . .or did not respond to the information that it did receive'*

It also noted that

> '*Although BP's executive and line management was responsible for ensuring the implementation of an integrated, comprehensive and effective process safety management system, BP's Board has not ensured, as a best practice, that management did so'*.

In its report, the panel included two recommendations directed specifically at the Board covering, Process Safety Leadership and Board Monitoring of process safety.

NIMROD

Whilst the failure of the Nimrod aircraft over Afghanistan was not a process safety event there are many similarities. These included failure to prepare an effective safety case, failure to look for the root causes behind an unacceptable number of onboard fuel leaks and a lack of clear organisational accountability between BAE systems, the MOD and the RAF. These led the inquiry to recommend the implementation of a new set of principles covering,

> '*Leadership, Independence, People and Simplicity together with a new safety culture, a*

Reporting Culture, a Just Culture, a Flexible Culture, a Learning Culture, a Questioning Culture.

DEEPWATER HORIZON

BP's internal inquiry into the losses in the Gulf of Mexico (Ref 7) has highlighted a number of failings which contributed to the loss. To quote the report *'a complex and interlinked series of mechanical failures, human judgments, engineering design, operational implementation and team interfaces came together to allow the initiation and escalation of the accident. Multiple companies, work teams and circumstances were involved over time'* Whilst the technical issues are outside the scope of this paper it is clear that there were failings in the relationship between BP and its contractors. This was confirmed by Tony Hayward in his appearance at the UK's Parliamentary Energy & Climate Change Committee (Ref 8), where he admitted that *'What we have here is a lack of rigour and a lack oversight of contractors'*

Although BP made significant changes after Texas City and implemented a companywide programme to increase the focus on process safety it is clear that this was not enough to bring the Safety Culture up to the desired level.

The key lessons from these incidents and others were used to structure the course developed for board members and senior executives.

COURSE STRUCTURE & CONTENT

In order to address the issues discussed above it was decided that, whilst a broad understanding of the basic principles of process safety management was important, there was a need to provide plenty of opportunity to discuss the application of the principles to the company concerned. In addition, to ensure that the course was aligned with the companies concerns and any process safety initiatives it was important that it be preceded by meetings between the course tutors and the company's corporate safety manager.

The courses have started with an evening session covering the impact of recent incidents and a discussion of the ways in which process safety can be affected by the relationship between the company and its contractors. This session has served to bring the topic to life and to illustrate the wider implications of an event.

The next part of the course covered:

- the shared understanding of the hazards associated with the business and of their potential consequences;
- the principles of Process Safety Management;
- the mechanisms used by the board, including auditing and key performance indicators (KPI) etc, to ensure that the risks are being properly managed;
- safety culture, leadership and the ways in which the board ensures that a commitment to process safety is communicated throughout the company.

Throughout the courses considerable time was made available for facilitated discussion and the development of action plans specific to the needs of the company.

By ending the course with a session to identify actions and responsibilities the material becomes grounded in pragmatic outcomes and builds a sense of commitment to using the insights gained throughout the course.

EXPERIENCE TO DATE

At the time of writing the course has been delivered to two major companies working in the UK nuclear sector:

- Energy Solutions, UK subsidiary of an American company responsible for the operation and decommissioning of the UK's Magnox Power stations and
- Rolls Royce Marine Power, responsible for the development of marine nuclear power plant.

In both cases the course was attended by the board chairman and a majority of board members, including in one case the company secretary and the finance director.

The course reinforced common issues and best practice in process safety management. As is to be expected many of the other issues were particular to the company concerned and included the need for a clear understanding of the differences between managing safety around products, process and personal safety and the governance of the different mechanisms. A common area of interest was the establishment of relationships between the company its contractors which could form a basis for high standards in process safety performance. Both companies have commented on the value of the courses which resulted in the creation of a shared understanding of the issues likely to be encountered in meeting changing business direction and priorities and worldwide skills shortages.

FUTURE DEVELOPMENT

The course aims and content have been shared with Environment Agency and with senior members of the HSE who have given strong support for its further development and application in other companies where the management of process safety is of importance. The experience gained above has given the Institution the confidence to promote the course more widely, initially with companies in the chemical and energy sectors.

Whilst the current course has focused on meeting the needs of the Board its use for groups of senior mangers is also being considered.

CONCLUSIONS

Events over the last few years have demonstrated the need for greater understanding of process safety at board level. A course developed by the Institution of Chemical Engineers is one way of addressing these issues and has proved to be of benefit to two companies working in the nuclear sector. Based on this it is planned to extend the programme to other companies in the energy and nuclear sectors.

REFERENCES

1. The report of the BP U.S. refineries independent review panel (The Baker Panel) available from bp.com
2. Reports into the explosion & fire at the Buncefield oil storage depot, available from hse.gov.uk
3. Turney & Thorpe, Improving the understanding of Process Safety, 13th International Symposium on Loss Prevention & Process Safety in the Process Industries, Vol. 2, p. 3.
4. The Turnball Report, Revised guidance for Directors on the Combined Code, www.frc.org.uk/documents/pagemanager/frc/Revised%20Turnbull%20Guidance%20October%202005.pdf
5. Hopkins, Lessons from Longford, CCH Australia, ISBN: 1 86468 422 4.
6. The Nimrod Review, HMSO, 2009, ISBN: 9780 102962659.
7. Deepwater Horizon, Accident Investigation Report, available from bp.com
8. Financial Times, 16 September, 2010.