

# **Bill Callaghan's presentation to the 12th International Symposium on Loss Prevention and Safety Promotion**

**22 May 2007**

**"Ensuring safety in the chemical and major  
hazard industries : the criticality of leadership,  
process safety systems and indicators to  
effective management"**

## **Introduction**

My thanks to Mike Considine and the IChemE Organisation Committee for the opportunity to speak at this the 12<sup>th</sup> International Symposium and to address the lessons that we can and must learn from major hazard accidents.

If I may I would like to take a few moments to re-visit the vision at the heart of HSC'S strategy for workplace health and safety, that is, to see health and safety as a cornerstone of a civilised society and with that to achieve a record of workplace health and safety that leads the world. This strategy builds on the success and develops the Revitalising Health and Safety strategy of 2000. At the heart of the strategy is a public acknowledgement by HSC/E of the importance of understanding and valuing the contribution of others to achieving the desired improvements and the reduction in the incidence of ill health, injury and days lost in the workplace.

We are committed to :

- Developing closer partnerships to achieve our aims
- Helping people to benefit from effective health and safety management and a sensible health and safety culture
- Focussing on our core business and the right interventions where we are best placed to reduce workplace injury and ill health, and
- Communicating the vision

HSC/E has made considerable progress, working closely with our partners, to take the strategy forward and energise our approach to improving workplace health and safety.

Lets make clear at the outset that the central aim of HSC/E's Major Hazards Strategic Programme is for Great Britain to lead the world in the control of major hazard risks.

Underpinning this aim are key three objectives guiding the work of HSE's Chemical Industries Division :

- To reduce the probability of a major hazard accident through interventions under the COMAH Regulations
- To work with industry and other stakeholders to ensure that people leaving work at the end of the day do so in an at least as good a state of health as when they started
- To provide advice on Land Use Planning issues on the basis of risks to people offsite from on-site operations

There have been a number of high profile incidents at major hazard process industry sites both here in the UK and overseas. Even without incidents as those at BP's Grangemouth and Texas City refineries, at Buncefield, at Conoco Philips's Humberside refinery and at Terra Nitrogen, industry has a clear responsibility to demonstrate that risks are being effectively managed to

ensure that risks are properly controlled. Major incidents have raised HSC/E concerns and a clear sense that performance is not as good as it should be and has to be if we are to achieve our goal of 'best in world'.

Later this year will be inviting major hazard stakeholders to a conference to address safety in your industry. This event will bring together all of the important players drawn from business, the trade unions, the regulator and Government with the aim of getting to grips with those barriers to the achievement of world class leadership on the control of major hazard risks.

There is considerable amount of ground I wish to cover – and the challenges faced by business and the regulator if we are to continue to make progress and achieve our strategic goals :

- The progress we have made towards the achievement of our Major Hazard precursor targets
- Lessons learnt from major incidents including BNGSL THORP, BP Texas City and Buncefield
- The importance of safety process indicators and the contribution of HSE's recently developed guidance in driving improvements
- The critical importance of board level leadership, director responsibility and safety culture – I will issuing a challenge to the hazard industry to work with HSE to make top level leadership a reality

## **Performance against targets**

### **(i) Ill-health, injury, fatalities and days lost**

Progress since the Robens report on safety and health at work in 1972 and the enactment of the Health and Safety at Work Act in 1974 has been marked: 160 employees and 52 self-employers were killed at work in 2005/06, the lowest number and the lowest rate on record. A cautious estimate is that

over 5,000 lives have been saved by the health and safety improvements introduced following the 1974 Act .

One key aspect of Revitalising Health and Safety was the setting of targets for the reduction of the incidence of ill health, injury and days lost in the workplace by 2010. There were a number of influential actors in the field of health and safety who questioned the value of hard targets. I am passionate in my belief and certain on the basis of the evidence that targets have a vital role to play in driving up performance and indeed in assisting Government and our stakeholders in assessing HSC/E's effectiveness in using public resources to deliver our part of the bargain – set out clearly and transparently in our Public Service Agreement.

Good progress has been made since 2000 in reducing the incidence of injury, ill health and days lost in the workplace. A judgement on our performance today is that the battle to improve safety is being won, but we should not be complacent, and although progress is being made to improve health, much more needs to be done. Without doubt, there are major challenges ahead, importantly on reducing fatalities.

I would like to bring out the challenge we face on reducing fatalities. Whilst the trend in the numbers of fatalities to workers has fallen considerably over the last six years – down from 292 in 200/1 to 212 in 2005/6 – it is not a given that this trend will continue. The number of fatalities in particular sectors including construction, waste and refuse disposal and agriculture, are serious cause for concern. Indeed we must not lose sight of the three fatalities in the chemical industry in 2004/5 and 2005/6 – your goal must be to ensure that there are no fatalities.

## **(ii) Major hazards**

HSE'S major hazards work seeks the regulation and safe management and control of those industries where catastrophic failures have the potential

cause significant harm to people or society. Whilst occupational health and safety issues are addressed in these industries the prime focus is on process safety. Our precursor targets have been developed to enable to measure the potential for error or failure on the overall safety process.

HSE's Major Hazards Strategic Programme has continued to perform well despite the increasing demands placed upon its resources by the Government's Energy Review, the implications of Nuclear New Build and HSE's continuing investigation into Buncefield.

Catastrophic incidents such as Buncefield remain rare events and precursor incidents in the onshore, offshore and nuclear industries continue to show a downward trend since the base year (2001/02).

Our major hazards precursor PSA targets are as follows :

- The number of events reported by licence holders, which HSE's Nuclear Installations Inspectorate judges as having the potential to challenge a nuclear safety system – outturn for 2006/7 was 126 down from 143 in 2001/2
- The number of major and significant hydrocarbon releases in the offshore oil and gas sector – outturn in 2006/7 was 73 down from 113 in 2001/2
- The number of relevant RIDDOR reportable dangerous occurrences in the onshore sector – the outturn in 2006/7 was 158 down from 179 in 2001/2

On the basis of the latest information we have HSE remains on track to deliver both the onshore and nuclear PSA targets. However, precursor incidents in the offshore sector have risen slightly above the target level reflecting the recent upsurge in offshore activity, which has exacerbated problems with a lack of competent and trained personnel in the industry,

ageing offshore plant and equipment, and maintenance issues. HSE continues to work closely with the offshore industry to address these issues.

### **Lessons learnt from major incidents**

Business success in all major hazard industries depends upon “sustained operational excellence” and goes hand in hand with delivering high standards of process safety and conventional health and safety. This is a message that HSE Board members have been pushing in their regular meetings with CEOs and directors of major hazard businesses operating in Great Britain.

Major incidents and events continue to happen around the world, often in regulated industries and involving companies or facilities that were considered to be high performers. In recent years, high profile cases include: BP’s Grangemouth and Texas City refineries, BNGSL’s THORP installation, Buncefield and Terra Nitrogen.

There are many common factors from these events relating to management for safety and cultural issues, regardless of the technology. Duty holders and regulators need to put more concerted thought and effort into analysing and understanding the key lessons, identifying appropriate actions and ensuring they are effective. Without change there is no learning.

A fundamental step to enable duty holders and regulators to become learning organisations is a change in culture. The quest for learning should be ingrained, a way of life not a finite project to be 'put to bed'. It requires an open, questioning mind. Established ways should be challenged, using world-wide experience as a continually evolving basis for learning. Major events should be viewed as learning opportunities, rather than assuming events elsewhere are not relevant or could not happen here.

Duty holders and regulators should be continually vigilant for learning opportunities. This should not be restricted to narrow industry sectors. Significant events in the world in any sector should be identified and reviewed

for potential lessons. There should be more engagement between regulators and duty holders to share information and ideas on lessons. This requires openness and trust.

**(i) BNGSL THORP**

Many of you will be aware of the circumstances surrounding HSE's Nuclear Installations Inspectorate investigation into the leak of radioactive liquor inside a shield facility at the THORP plant in April 2005. HSE's investigation uncovered a catalogue of operational, managerial and maintenance errors that allowed radioactive liquor to escape from primary containment.

In October 2006 BNGSL was fined £500,000 plus costs after pleading guilty to breaching health and safety law.

After the hearing Dr. Mike Weightman, HSE's Director of Nuclear Safety and HM Chief Inspector of Nuclear Installations, said:

“Our extensive investigation into the events in THORP has shown that British Nuclear Group Sellafield Limited fell significantly short of the required standards for a considerable period of time before the leak was discovered. Although we stress that there is no evidence of any harm to workers or the public, the leak being contained within a stainless steel lined, heavily shielded cell, there had been a significant prolonged reduction in attention to the high standards demanded, something we are not prepared to tolerate.”

In addition to the 55 recommendations contained in HSE's investigation report there were a number of broader lessons to be drawn from THORP :

- The cause of the leak can be traced back to design inconsistencies and inadequately executed modifications – it was clear that the potential impact of these modifications had not been fully assessed
- There were cultural shortcomings too at the plant – culture within the plant condoned the ignoring of alarms, non-compliance with certain key

operating instructions and safety-related equipment not being kept in effective working order

- Major hazard businesses as BNGSL need to have effective arrangements in place for monitoring, audit and review and a culture that encourages staff to question and challenge when they think procedures are wrong
- Industry needs to be encouraged to strive for sustained excellence in its operations and not be misled by the absence of incidents or good health and safety metrics in relaxing its vigilance in securing effective major hazard control

HSE's Nuclear Directorate has produced principles on Leadership and Management for Safety. In developing these principles, HSE has drawn upon lessons from world-wide events to identify generic attributes important to effective leadership and management for safety. One of the principles relates specifically to learning. HSE is using these principles to develop an integrated intervention strategy for application at corporate level within licensees. This will include more focus on influencing to achieve improvements to safety including the use of the leverage model.

HSE has undertaken a review of the lessons for the regulator arising from THORP and is leading an international 'learning from experience' review and is evaluating its processes against IAEA benchmark good practices.

## **(ii) BP Texas City**

I am sure that many of you are familiar with the findings and recommendations of the Baker panel and the US Chemical Safety Board's reports concerning the Texas City catastrophe which resulted in the deaths of 15 people and injury to 150.

The opening statement of the report of the Baker panel struck an important chord and one with wide-ranging implications that go way beyond the major hazard sector,

“We are under no illusion that deficiencies in process safety culture, management, or corporate oversight are limited to BP. Other companies and their stakeholders can benefit from our work. We urge these companies to regularly and thoroughly evaluate their safety culture, the performance of their process safety management systems, and their corporate safety oversight for possible improvements.”

The CSB published its report at the end of March. The CSB hoped that their report together with that of the Baker panel would establish a new standard of care for corporate boards of directors and CEOs throughout the world,

“Process safety programmes to protect the lives of workers and the public deserve the same level of attention, investment and scrutiny as companies now dedicate to maintaining their financial controls.”

The key finding was that organisational and safety deficiencies at all levels of the BP Corporation caused the 2005 explosion.

At this juncture I would like to say a little about the Buncefield incident, though the investigation still continues and legal considerations place me under severe constraints. The Major Incident Investigation Board is continuing its work and has recently published a report on the design and operation of fuel storage sites on 29 March 2007. You can access the report on the Buncefield Investigation Board’s website -see [www.buncefieldinvestigation.gov.uk](http://www.buncefieldinvestigation.gov.uk)

The MIB’s report of March 2007 has a paragraph on the Baker Report, noting an alignment of thinking. The MIB challenged the industry to substantially strengthen standards at sited handling large quantities of fuel and called for a programme to revise guidance and standards for process safety.

So it seems the UK sector which stores and transfers petroleum products on a large scale is faced with some similar challenges to those arising from Texas City.

HSE has expended considerable time and resource in support of the work of the Buncefield Major Investigation Board. This has of necessity involved a diversion of resources away from other areas of major hazards regulatory work and has caused both HSC and HSE concern. I would like to place on record HSC's appreciation of the work undertaken by HSE staff in support of the investigation – their commitment and determination to get the job done is applauded.

### **Safety Process Indicators**

Returning to the CSB's report on the Texas City explosion it is important to note that stakeholders across the major hazard industry were called on to work together to develop a new standard defining performance indicators for process safety. I am sure that the work and expertise of HSE and major hazard operators in Great Britain will feature large in this work.

A recent, concrete example of partnership working in the major hazard industry and the benefits demonstrates well the fruits that such collaboration can produce. The recently published guidance, "Developing process safety indicators – a step-by-step guide for chemical and major hazards industries", jointly produced by HSE and the Chemical Industries Association, enabling major hazard operators to develop indicators to show that process risks are being properly controlled.

I would like to reinforce the importance of having in place effective control systems. The Swiss cheese model demonstrates this well.

The slices represent the management (risk) control systems' put in place to prevent or mitigate the consequences of an incident. The slices or barriers stand between harm/hazard and people/environment. We normally like safety

in depth by using multiple barriers. Reason's model shows that none of these barriers are perfect (imperfection being the holes) and even where you have many layers there is always a chance that the imperfections will line up resulting in an incident. As a recent example - at a major petrochemical complex a major accident was recently averted by the robustness of the very final barrier (control measure) whereas 26 of the preceding barriers all failed.

The link to performance measurement and using performance indicators is that companies should strive to have an indicator in place for each significant barrier. Lagging indicators - show when the holes appear in any one barrier (system deterioration - but not catastrophic failure) whereas leading indicators show that the most important part of the barrier is still in tact (positive assurance).

This new approach to tackling this difficult issue began back in 2000 following a series of incidents at BP's Grangemouth refinery. The report of Grangemouth major incident investigation investigation contained a number of recommendations including a concern that the chemical industry relied too much on lost-time injuries to measure its health and safety performance. As a result HSE teamed up with the CIA to carry out a pilot study to design an approach involving process safety indicators for major hazard sites.

Coming out of Grangemouth was a growing acceptance that performance measurement information was rather limited with a focus on measuring failures :

- Unacceptable level of process safety related Dangerous Occurrences especially in relation to loss of containment incidents.
- Major Hazard Industry measured safety by using Lost Time Injury Rates

There were underlying problems with the information gathered to monitor and measure performance :

- Critical Systems deteriorate over time without warning until they fail catastrophically.
- Audits tend to be too infrequent & focus on compliance. Workplace inspections focus on personal safety.
- Focus on system design not on delivery of risk control.

The guide produced by HSE and the CIA does not provide a list of indicators as such but a stage approach for operators to work through. The real value of this approach is that it shows operators how to design a leading indicator – something that warns a management system is starting to deteriorate before something goes seriously wrong.

Key features of the HSC 254 guidance is its use as a tool to assist major hazard organisations to determine :

- What can go wrong?
- Where within the facility will these challenges to integrity be most critical?
- What systems are in place to manage those challenges?
- What does success look like – measure using a lagging indicator.
- What are the critical activities which must work right to deliver the intended outcome – measure continued operation using a leading indicator.

The advantages of HSG 254 are clear :

- Assists you to directly measure control of risk
- Provides information to those involved to take early corrective action – act on early warning
- Flexible – can be applied in any sector
- Places the onus on the operator to show measuring the right things.

It's a new process and both industry and HSE have still got a lot to learn. In the long term we expect all major hazard operators to have process safety

indicators and to monitor and review them as part of their safety management systems. If we are to make significant improvements in the management of major hazard risks.

### **Board-level leadership, director responsibility and safety culture**

There is one other element, I wish to address, and that is a vital component in the work of delivering our goal of leading the world in the control of major hazard risks. But board level leadership and director responsibility on health and safety should be a given for all organisations whatever the size and whatever the sector.

The report of the Baker panel paid tribute to the work of HSC/E in developing advice and guidance about the role of boards of directors in overseeing organisation's health and safety performance and also the production of guidance on process safety indicators covered earlier in my presentation.

HSC/E have been very active in the promotion of director responsibility and board-level leadership over the past six years. We published guidance on director's responsibilities for health and safety in 2001; HSE's guidance for the major hazard industry on leadership has been widely praised as have our series of director leadership case studies, including those featuring Esso and Rhodia.

I commend you too to have a look at the HSE publication, "Leadership for the major hazards industries", again accessible via the HSE web site (INDG277). The booklet is designed to assist directors and senior managers to refresh their knowledge, analyse their current approach and work to continuously improve health and safety performance.

I will give you one example of advice contained in the booklet concerning culture,

“A manager’s role is not simply restricted to directing work and monitoring compliance with rules and regulations. Managers must act as leaders and facilitators: they must encourage suggestions, motivate their staff and engage with the workforce to solve health and safety problems.”

Our efforts to promote leadership and encourage directors to take responsibility continue. Some stakeholders, including some among trade unions, are adamant that only through the enactment of new legal duties will stubborn and recalcitrant directors be persuaded to comply with the law.

The Commission, having carefully considered the mass of available evidence concerning board and director responsibility for health and safety, have concluded that the case has not been made that such a legislative change would result in the desired improvement. However the Commission recognises that the existing guidance needs to be re-invigorated and is currently working with the IoD and other stakeholders to this end.

Consultation concerning the new guidance is now underway with the goal of securing Commission agreement in July with publication following in October.

HSE, together with our Competent Authority partners, is currently engaging with industry stakeholders with the aim of setting up an onshore Major Hazards Group to promote leadership, taking on board the lessons from Buncefield, Texas City, THORP, and other incidents.

I know from my time as Chair of the Commission and the work we have undertaken with stakeholders that there are some truly excellent leaders within your industry who encourage and inspire those that they work with to pursue the very highest standards of health and safety performance. We are especially seeking a senior executive from the petrochemical industry to chair this new group and I call on the best of your leaders to come forward to work with HSE and the Competent Authority to ensure that their values, their approach and achievements inspire and encourage others in the industry. Do contact me if you wish or leaders within your organisation to take part in this important initiative.

The prevailing culture in an organisation is heavily determined by the visible attitudes and behaviours of directors and senior managers. It is important they make a real effort to send out the right messages to those 'below' them ensuring that messages do not suggest, albeit unintentionally, that safety can be ignored and corners cut if necessary.

Two key cultural drivers have been cited in recent research :

- A strong and growing conviction among organisations that accidents and injuries are unacceptable and
- A firm belief that business benefits through reduced costs, improved morale and increased productivity

A sound safety culture has its basis in the messages that come from the top of the organisation. Senior managers and the board of directors set the overall agenda and need to give a clear vision as to what is expected, preferably with objectives against which progress can be assessed. This top-level commitment must be demonstrated through their actions so that all managers and staff can see that health and safety is taken seriously.

## **Conclusion**

I have covered a lot of ground much of which you are deeply familiar with and indeed expert on. But I do want to remind you that major challenges have still to be met if we are to achieve the goal of Great Britain leading the world in the control of major hazard risks. I have attempted to set out some of the key actions and initiatives we need to work together on in partnership - including on promoting and ensuring top level leadership throughout the major hazard industry. Lets make sure our work to achieve this goal is successful not only in business terms but also for the health and safety of those who work in the industry and for society more generally.