

# “The use of Safety Cases in Certification and Regulation” by Professor Nancy Leveson

A review by Peter Wilkinson<sup>1</sup>

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## Introduction

There is an ongoing debate, (primarily) in the United States about the utility or otherwise of safety cases in relation to offshore oil and gas activities in the wake of the Deepwater Horizon disaster. Professor Leveson’s paper, “The use of Safety Cases in Certification and Regulation” has attracted particular attention because of the statement that:

*“...some industries that have adopted a safety case and goal-based approaches have experienced much higher accident rates, such as offshore oil exploration and production.”*

This bold statement has certainly attracted attention to the paper, no doubt due at least in part to the high esteem the author is justifiably held in. Some have assumed the paper represents a serious blow to advocates of the use of safety cases in offshore oil and gas. However, Professor Leveson’s statement does not appear to be substantiated and is not borne out by the published data (in the North Sea for example).

The paper does not (at least in this reviewer’s opinion) mount a comprehensive argument that safety cases are not a useful tool for regulators. And in any event, there is no suggestion by Prof Leveson that this was her objective in writing the paper. The paper does contain some useful reminders of the limitations of safety cases but does *not* make the case that safety cases do not work.

Furthermore, the paper seems a little unbalanced at times by giving significantly greater coverage to a particular and well-known failure of what was called a safety case regime (The Nimrod accident in Afghanistan), compared with commentators and researchers who have pointed out the benefits of safety cases.

The paper correctly points to the inevitable problem of a lack of a rigorous evidential basis on which to judge the efficacy of safety cases. As has been pointed out previously, it is difficult to prove that safety cases have prevented something that has not happened. Major incidents are relatively rare anyway and it is difficult to tease out the influence of safety cases from the many other influences.

Most of the conclusions in the paper (in effect worded as recommendations) seem sensible. However, the author does not seem aware (or at least acknowledge) that these issues are widely understood and accepted by experienced practitioners and for the most part have already been implemented in mature safety case regimes, such as the UK.

This paper provides detailed observations of the Leveson Paper. In doing so, it is structured by referring to the *headings in the original paper to provide some order to the comments and these*

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*appear as bold headings in inverted commas. Additional headings in the text are the reviewers and do not have quotation marks.*

### **“Types of Regulation”**

To explain the differences between these two concepts authors often present them as if they are alternatives. In practice, if not theory, it is not unusual to have both prescriptive and goal setting legislative requirements in the same regulatory regime. Lord Cullen who presided over the Piper Alpha disaster explicitly addressed this issue and his recommendation that both types are needed was implemented (as is also the case in Australia). Professor Leveson states the requirement to produce a safety case is an example of a prescriptive requirement. This is only true in a narrow, academic sense. A company who wishes to operate an offshore facility in Australia (or the UK) *must* produce a safety case which conforms to certain rules as to its content. Therefore to this extent it is a *prescriptive* requirement. However, most practitioners would not regard this as an example of prescription but rather as the cornerstone of the safety case-based *performance or goal setting approach*. This is because the contents of the safety case and the arguments presented, are up to the person on whom the duty falls under the legislation, “the duty holder,” but subject to scrutiny by the regulator.

Professor Leveson’s paper is written primarily in the context of the United States and those with experience of legislative regimes elsewhere, such as the UK, may want to add to some aspects of her definition of performance or goal setting approaches. She says these have a “...focus on desired measurable outcomes....a goal...which may be a risk target.” However, not all the goals are numerical. For example the approach to occupational health and safety adopted in 1975 in the UK Health and Safety at Work Act, includes a general duty on employers and others to ensure, inter alia, health and safety *so far as is reasonably practicable*. This too is a goal, albeit a qualitative one. This term had received extensive legal consideration in relation to health and safety in Common Law compensation cases for very many years in the UK. Consequently, it was a very familiar term and already widely in use in health and safety statutes at the time of the introduction of the Health and Safety at Work Act. Thus it was only a small step to use this term more widely as the ALARP principle was developed.

Readers who want to learn more about ALARP are encouraged to read the UK Health and Safety Executive’s summary of ALARP.<sup>2</sup>

### ***Goal setting, safety cases and political goals***

Professor Leveson seems to imply in the paper that safety cases are preferred by the regulated, for commercial and not safety reasons and perhaps therefore we should be suspicious of them because of this reason and the political support this may have attracted.

*“...interest in performance – based regulations ...by government agencies, starting in the U.S. during the Reagan administration, often spearheaded by pressure from those being certified.”*

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<sup>2</sup> See for example <http://www.hse.gov.uk/risk/theory/alarp2.htm>

Complying with the safety case requirements was not a cheap and easy exercise. On the contrary it requires duty holders to take much more responsibility for managing the risks than hitherto. Rulemaking could never have kept up with the significant changes in technology and would have stifled innovation including safety innovation. The driver for the safety case regime was not cost or political imperatives but efficacy. Prescription alone could not have done the job. This was Lord Cullen's conclusion not a political decision. It must be difficult to understand the depth of emotion caused by a tragic loss of life of such magnitude in the Piper Alpha disaster to understand the determination on the part of all parties to prevent it happening again. The move to add safety cases to the suite of regulatory tools needs to be understood as an output of a careful and generally very well regarded inquiry and not as a self-serving tool to make life easier for industry.

### **"Performance – Based Regulation and Safety Cases"**

There are some minor points (in the context of the paper) which deserve correction. In a section of the Paper with the above title, Professor Leveson comments that, "*Government oversight of safety in England started after the Flixborough explosion in 1974.*" Although a minor point, your reviewer recalls joining an organisation called Her Majesty's Factory Inspectorate (HMFI) which was formed in 1833 to regulate safety, health and welfare. (Your reviewer joined a little later than 1833!) HMFI became a constituent part of the Health and Safety Executive, (HSE) in 1975 as a result of the Health and Safety at Work Act 1974. However, it is accepted that Flixborough stimulated significant organisational change with the formation of HSE and improvement in the regulation of major hazard sites.

Another minor point is that Professor Leveson comments that "*The term safety case seems to have emerged from [the] Lord Cullen...Piper Alpha [report]*" However, on the next page Prof Leveson refers to the requirements of the UK Nuclear Installations Act 1965 "*to create and maintain a safety case...*"

### ***Comparison with nuclear submarines in the U.S.***

To this reviewer looking at safety cases through the eyes of the offshore oil and gas industry, the comparison with nuclear submarines run by the military perhaps does not provide a strong point of comparison. A relatively homogeneous fleet with only a small number of different classes of "boats" run by one organisation is a world away from the wide range of offshore facilities ranging from semi-submersible drilling rigs, tensioned leg platforms, steel jacketed production platforms to floating production storage offtake systems (FPSOs), all with different risk profiles. Overlying the technological differences are the organisational ones. These facilities are operated by a wide range of different companies. Even ostensibly similar production platforms are typically unique in specific design and equipment. It is the lack of diversity in the US nuclear submarine fleet which makes prescription possible. Lord Cullen's report into Piper Alpha has a good account of why the regulatory approach was changed to incorporate the safety cases in the offshore oil and gas industry. The paper does not take this into account and, thus, although the nuclear submarine fleet is complex and "high-risk" industry, this could be regarded as a less than useful comparison.

### **"Potential Limitations of Safety Cases"**

Professor Leveson (rightly) points out that it is difficult to provide evidence "... that something is safe." Exactly the same problem occurs with prescriptive rules. In a sense prescriptive rules are saying – "follow these rules and you will be safe."

Professor Leveson makes some important points in relation to confirmation bias. It is for this reason that both the Australian and UK offshore petroleum safety case regimes place so much emphasis on the importance of the rigorous challenge to the documented safety case by a regulator. And in the Australian and UK situation the quality of the regulator, their organisational status and salaries seems somewhat higher than in the US, at least in the past. The importance of an effective regulatory body as part of a safety case regime does not seem to receive sufficient attention in the paper.

### **“Experience with Safety Cases”**

The Leveson paper provides a useful contribution to the discussion on safety case regimes through highlighting some of the regime’s weaknesses. However, the section on Experience with Safety Cases is flawed.:

*“...some industries that have adopted a safety case and goal-based approaches have experienced much higher accident rates, such as offshore oil exploration and production.”*

This does not appear to be substantiated and no source given for it. For UK North Sea data see <http://www.hse.gov.uk/offshore/statistics/stat1011.htm> which gives a time line (but only from the late 1990s – the safety case regime started in the *early* 1990s).

There is of course a significant methodological problem with research on the efficacy of safety case regimes which Prof Leveson refers to and is also mentioned in the Vectra study referenced, namely how does one separate the influence of the safety case from other influences? Additionally, one could mention the difficulty of proving that something *did not occur* because of a safety case. We know we cannot use traditional personal safety data such as loss time injuries (LTIs) because of the lack of correlation between personal safety and process safety (see Andrew Hopkins, Lessons from Longford for one of the earlier discussions of this). So traditional personal safety data on loss time injuries do not really help us. Added to this is the comparative rarity of major disasters and the corresponding absence of a large data set.

Professor Leveson is surely right to say that there have been few rigorous studies on the efficacy of safety cases. But it is a little disappointing that Prof Leveson does not quote more extensively from the study we do have, namely the Vectra work<sup>3</sup>. Amongst other things this concludes:

*“There is good support for SCRs [Safety Case Regulations] acting to improve overall hazard identification and control. This is largely due to the need to systematically review and assess systems and processes. In some instances this assessment was the first time the organisation had thought about their operations in such a structured and rigorous way.”*

*“There are mixed views about the whether the SCR improves overall safety culture and safety communications within a company. Generally there is a positive view on this with improved workforce understanding of major hazards.”*

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<sup>3</sup> Vectra Group, Ltd., “Literature Review on the Perceived Benefits and Disadvantages of the UK Safety Case Regime,” Report No: 402083-R01 (rev3), August 2003. <http://www.hse.gov.uk/research/misc/sc402083.pdf>.

*Business issues are more contentious with some companies questioning the cost/benefit ratio (CBR) of producing and maintaining a Safety Case to comply with the SCR. In one or two instances, it is suggested that it can become uneconomic to continue operations...”*

### **Conclusion**

Professor Leveson’s paper is an interesting, useful but ultimately flawed paper. It could have been better balanced by referring to the positive aspects of the Vectra research quoted and not substantially relying on the Nimrod disaster, which was a seriously flawed safety case model. The paper’s recommendations are a useful summary of what is required to make safety case systems work with the exception that the role of an effective regulator is not addressed. Nor does the paper acknowledge that these recommendations are well known and in fact already applied in mature safety case regimes such as in UK and Australia.

**Peter Wilkinson**

**Sydney, December 2011 (revised March 2014)**

### ***Biographical Note: Peter Wilkinson***

Peter is Managing Director of Noetic Risk Solutions where he focusses on providing strategic advice to Government, Boards and leadership teams on safety management and enterprise risk management. In the last 18 months, Peter has completed assignments for upstream oil and gas clients in Australia, China, UK, Malaysia, Timor Leste, New Zealand, and the US Gulf of Mexico as well as for the Australian Government on the Montara oilfield blowout. Peter is also currently under contract to the US Federal Agency, the Chemical Safety Board (CSB) as an adviser to their investigation of the BP Deepwater Horizon disaster in the Gulf of Mexico

From 2005 to 2009 Peter was the Group Manager for Operational Excellence and Risk in Caltex Australia and a member of the Caltex Leadership Team. He oversaw the building of a process safety culture and the introduction of an enterprise wide risk management framework highly rated by McKinsey and Co for its approach to managing operational risks.

From 2001 – 2005, Peter was the principal “architect” for the development of the National Offshore Petroleum Safety Authority, (NOPSA). During this period, Peter was also an advisor to former premier Neville Wran during his review of mine safety in New South Wales, and with Andrew Hopkins advised the West Australian Government in their review of mine safety regulation. In 2002 the Brazilian Government invited him to review the revised regulatory system put in place following the loss of the Petrobras P36.

From 1991 - 2001 Peter worked in the North Sea for the UK’s Health and Safety Executive, Offshore Safety Division regulating the offshore petroleum industry following the Piper Alpha disaster. This included work on developing the safety case regime. He also had responsibility for all *onshore* oil and gas exploration and production which included on one occasion attending a blow out of a well in the grounds of a hospital!

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