

The Cost-Benefit Hurdle for Safety Case Regulation

A discussion paper prepared for the US Chemical Safety Board

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Introduction

Following the Macondo accident, the Presidential Commission advocated the adoption of safety case regulation for offshore petroleum production in the United States¹. The US Chemical Safety Board is also preparing a report on the Macondo accident which will address the issue of safety case regulation². The present paper does not seek to describe the safety case approach. It assumes that the reader has some familiarity with safety case principles. Readers who would like more information are referred to my article – “Explaining Safety Case”.³

One of the hurdles that any agency advocating new regulations must face is the requirement that such regulation be justified, so far as possible, using cost/benefit analysis. The proponents of safety case regulation therefore bear the onus of either justifying the new regulatory regime on cost/benefit grounds, or explaining why strict cost/benefit analysis is impossible or inapplicable in the case at hand. The purpose of this discussion paper is to consider the cost/benefit hurdle and to argue that safety case regulation for offshore petroleum production can in fact surmount it.

The presidential order

The starting point for this discussion must be the presidential order of January 18, 2011 on “Improving Regulation and Regulatory Review” (Executive Order 13563)⁴. The relevant parts are as follows:

“By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to improve regulation and regulatory review, it is hereby ordered as follows:

... [Regulation] must identify and use the best, most innovative and least burdensome tools for achieving regulatory ends. It must take into account benefits and costs, both quantitative and qualitative.

... [E]ach agency must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify)...

... Where appropriate and permitted by laws, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts....”

In short, the order recognises that

- costs and benefits may not always be readily quantified and may need to be discussed qualitatively, and

¹ National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. *Deepwater: The Gulf Oil Disaster and the Future of Offshore Drilling*, p252

² The CSB’s “Chevron report” will canvas the introduction of a safety case regime for *onshore* facilities. This paper deals specifically with the offshore environment, but the issues and arguments would be broadly similar for the onshore case.

³ http://regnet.anu.edu.au/sites/default/files/WorkingPaper_87.pdf

⁴ Reproduced in C Sunstein, *Simpler: The Future of Government*. (Simon & Schuster, New York, 2013), pp217-19

- an argument for regulation may be based on values such as equity and dignity. Such values are in principle not reducible to monetary amounts and the argument therefore cannot involve weighing costs against benefits in any quantitative way.

The organisation responsible for policing the presidential order is the White House Office of Information and Regulatory Affairs. For three years, from 2009 to 2012, the office was headed by Cass Sunstein, often described as President Obama's "regulatory czar". Sunstein has subsequently written a book describing the principles on which he operated. I shall return to the presidential order and Sunstein's interpretation of it later.

The difficulty of doing cost/benefit analysis for safety case regulation

Cost/benefit analysis must begin by identifying and if possible providing a numerical estimate of the benefits. For example, a cost/benefit analysis for a regulation requiring a particular safety feature in new cars would need to begin by estimating the number of lives that would be saved by the implementation of such a regulation. Subsequent steps would include estimating the dollar value of the benefits, which includes placing a dollar value on the lives saved⁵. One then needs to calculate the cost that companies would incur complying with the new requirement, and finally, compare the costs with the benefits⁶.

For safety case regulation the very first step – quantifying the benefits - is impossibly difficult. There are various reasons for this. Safety case regulation is designed primarily to prevent major accident events, disasters in simple terms. But whereas the concept of fatality is well defined in the car safety scenario, a disaster is much more difficult to define. So exactly what it is you are counting is hard to pin down. How many deaths does it take to make a disaster? Or alternatively, how much environmental damage is necessary to qualify as a disaster? Furthermore, whatever the definition, disasters are rare, making it very difficult to make estimates of the number of disaster prevented. To give an example, suppose you wanted to show quantitatively that the UK and Norwegian offshore industry is safer as a result of the introduction of safety case regimes in UK waters in the early 90s and in Norway at about the same time. DNV expert Robin Pitblado lays out the problem as follows⁷. If by disaster we mean an event with large scale loss of life, there were two in the 1980s - the Alexandre Kielland, a semi-submersible drilling rig which capsized in Norway in 1980, killing 123 people, and the Piper Alpha platform off the coast of Scotland that caught fire in 1987, killing 167 people. That, says Pitblado, is 2 in 8 years. "Straight line projection, might suggest 6 could have occurred in the following 25 years – when in fact there have been none". On the face of it, this is a dramatic improvement, presumably attributable to the new safety case regimes. But it is obvious, he says, that the numbers are far too small to be relied on in this way. He also highlights the definitional issue by noting that he is not counting the 1991 sinking and total loss of a platform that was being towed out of a fjord in Norway⁸. No one was on board and the platform was not operating, but in

⁵ There are numerous methodological and moral objections that can be made to valuing human life in this way. See Heinzerling L and Ackerman F, *Pricing the Priceless: Cost-Benefit Analysis of Environmental Protection* Georgetown University Law Center, 2002. These objections will not be canvassed here, since the aim of this paper is to make the argument for safety case regulation within the parameters laid down by the Office of Information and Regulatory Affairs, as far as possible.

⁶ For examples see Sunstein, op cit p158

⁷ Personal communication

⁸ Sleipner A platform

slightly different circumstances there could easily have been major loss of life. This occurred after the new regime had taken effect in Norway. Counting this as a disaster gives a rate of one disaster in the 25 years since the advent of safety case regimes – still a 6-fold improvement over the decade of the 1980s. But to repeat, the numbers are too small to be conclusive.

The problem came into sharp focus in the European Union in 2011/2012. In response to the Macondo accident the European Commission proposed to issue a directive to all member states to introduce safety case regimes for offshore petroleum production. In support of the new regulation, it commissioned a cost/benefit analysis that concluded that the benefits of the new regulation outweighed the costs, although not dramatically so.⁹ This analysis was a detailed effort to provide the kind of supporting argument envisaged by the presidential order on cost/benefit analysis. Nevertheless, it proved so controversial that a special expert review was commissioned to pinpoint the areas of dispute and if possible account for the differences. This expert review highlighted the difficulties involved in any attempt to carry out a cost/benefit analysis of safety case regulation and its chair concluded:

“In light of the inherent uncertainties ... it is difficult ... to evaluate the extent to which any analysis is or is not conservative. In essence, none of the analyses is wholly right or wrong. They reflect the effect of differing assumptions and approaches. Some may be more conservative than others, although the extent of any conservatism, or its converse, is difficult to judge”¹⁰.

The following paragraphs canvas some of the issues that undermined the Commission’s attempt to carry out a quantitative cost/benefit analysis.

Defining major accidents

The first challenge for the Commission was to clarify the definition of major accident, so that it was clearer what was to be counted. This is a vital first step if one is to talk about any reduction in numbers that might be achieved by introducing a safety case regime. The cost/benefit analysis identifies two distinct categories of major accident. The first is accidents that result in major damage to or loss of installations. This definition is independent of and takes no account of whether there was any significant loss of life¹¹. The second category of major accident is oil well blow out lasting more than 14 days¹². The evidence is that these longer-lasting blowouts result in major oil spills with environmentally costly consequences.

It is striking that the number of fatalities played no role in determining whether an incident counted as a major accident for the purposes of cost/benefit analysis. The Commission notes that the UK authorities place a value on life of \$US 2.4million and concludes that “loss-of-life costs are not estimated to be significant when put into the context of the very large costs this report focuses

⁹ European Commission. Commission Staff Working Paper. *Impact Assessment*, p 58. In fact the Impact Assessment (IA) considers various options of increasing complexity and it concludes that “the costs and benefits increase hand in hand with the complexity of the options” p 56. This is not an overwhelming endorsement.

¹⁰ Peer review meetings on the assessment of risks in the offshore oil and gas industry, 28 March & 2May 2012, Summary Report. http://ec.europa.eu/energy/oil/offshore/doc/20120703_summary_report_en.pdf

¹¹ www.ogp.org.uk/pubs/434-17.pdf

¹² European Commission. Commission Staff Working Paper. *Impact Assessment*, Annexes (A), p17

on.”¹³ This is one of the critical dilemmas of cost/benefit analysis of safety case regulation. It necessarily turns on the cost of infrastructure lost or damaged and the clean-up and compensation costs for major oil spills, which dwarf the monetised value of life lost. Yet in the minds of many people, a crucial part of the justification of a safety case regime is its capacity to protect human life, and in particular to reduce the risk of large scale loss of life such as occurred in Piper Alpha or Macondo. One might conclude from this that monetising the value of life in this context undermines the whole approach and that benefits in relation to loss of life must be treated qualitatively, not quantitatively. I return to this later.

The cost of major accidents

Leaving aside the issue of the value of life, there are numerous other problems that beset any attempt to estimate the true cost of a major accident. The Commission acknowledges this and restricts itself to “directly quantifiable costs” – clean-up and compensation costs in the case of oil spills, and property costs in the case of infrastructure loss or damage¹⁴. There are numerous technical difficulties involved in identifying even these direct costs that for the most part will not be addressed here. The statement of the chair of the independent review previously cited provides some indication of these problems.

There are various reasons why the true costs of a major accident may be much greater than the direct costs described above. First, there is the question of the extent to which compensation paid reflects the full costs of all those whose livelihoods have been damaged by a major accident. We know that major oil spills will affect industries such as fisheries and tourism in relevant coastal communities. But the impact on businesses in these industries spreads far and wide through their suppliers and employees. Compensation regimes will at best compensate for only some of this economic loss. As the Commission observes,

“care must be taken when using compensation costs as proxy for the true economic cost of an oil spill because the scope of the compensation regimes and the admissible claims are not all-inclusive, ... and the total amount of compensation is capped”.¹⁵

Casting the net even wider, the Commission states that its cost calculation “does not include indirect costs such as the effect on oil prices, the health of the oil industry, or security of energy supply. Although unquantifiable, these costs could also be very significant. They should, therefore, also be factored into any cost/benefit analysis of policies aimed at improving offshore safety, albeit qualitatively”¹⁶.

“Other important indirect impacts include the potential loss of major corporate earnings and its effect on investments (pension funds, for example, suffered badly as a result of the Deepwater Horizon incident), interruptions to other offshore sectors, such as wind farm construction and operation, or maritime transport”.¹⁷

¹³ A p4

¹⁴ A p11

¹⁵ A p9

¹⁶ A p11

¹⁷ IA p10

Finally, a very large oil spill could trigger a moratorium on drilling such as was imposed following the Macondo accident. This is estimated to have cost billions of dollars and tens of thousands of jobs¹⁸. It could even lead to the termination of offshore licensing¹⁹. Such economic costs are not included in the Commission's calculations.

The Commission is quite clear about all these limitations. It describes its technique therefore as a "partial cost-benefit analysis"²⁰. The implication is that the true costs of major accidents are much greater than any conceivable quantitatively derived estimate. A corollary of course is that the benefit to be achieved by any reduction in accident rate will be far greater than the quantitative cost estimates suggest.

Estimating expected risk reduction

I turn now to the reduction in major accident rate that could be expected to follow from the introduction of safety case regimes throughout Europe. The evidence the Commission relies on is primarily from the UK, where such a regime was introduced for offshore oil and gas in 1992²¹. It concludes that the new regime reduced the major accident rate by 50%²² and that therefore countries in the EU not currently using safety case regimes could achieve a 50% reduction in accident costs by doing so²³.

Let us consider the basis of this claimed 50% reduction. The Commission makes no attempt to demonstrate it directly by looking at major accident rates. The fact is that the numbers of major accidents in the UK offshore sector are too small to be able to identify trends²⁴.

The problem of small numbers was highlighted in a 2006 report commissioned by the UK regulator – the Health and Safety Executive. The report addressed the effectiveness of the UK *onshore* safety case regime set up in 1999 under the Control of Major Accident Hazard (COMAH) Regulations. It did so by comparing the major accident rate before and after the introduction of the safety case regime. The report stated:

"We found no direct evidence that COMAH is resulting in a reduction of the risk of major accidents. However as COMAH is designed to manage risks from rare events we would not expect to be able to see statistically robust evidence of an effect"²⁵.

¹⁸ A p3

¹⁹ IA p11

²⁰ A p30

²¹ A p34

²² IA p12

²³ A p38. The Commission also considered the option of introducing a superior version of the safety case regime that would involve making improvements to the regimes operating in the North Sea, to date, the best in class. It assumed that this too would effectively halve major accident losses across the EU. It provided no further argument in support of this assumption, other than that discussed in the text. A p52

²⁴ One can get some indication of the numbers involved from statistics produced by The Oil and Gas Producers Association. It does not provide stats for the UK in particular but rather for "Europe North Sea", obviously a substantially larger pool. Furthermore the data are a summation of all accidents from 1970 to 2007. Apart from helicopter losses there were only 17 instances of the total loss of a facility of any type during that whole 37 year period. One can reasonably conclude from this that the number of losses in *UK waters* in this period was substantially less than 17. Hence, whatever trends might be apparent in the data would probably not be statistically significant.

How, then, did the European Commission conclude that there had been a 50% reduction in the risk of a major accident? It did so by noting that the injury and fatality rate dropped by 50% during this period²⁶. It attributed this, cautiously, to the introduction of the safety case regime. The caution is expressed in the following paragraph.²⁷

“It is difficult to wholly attribute these improvements to regulatory changes for a number of reasons. Industry practices may improve over time and some regulatory changes may reflect an already widely implemented industry practice...and compliance levels may significantly vary over time.”

However there is a much stronger reason to question the way the commission has used these injury statistics. It is now widely recognised that injury stats are at best a measure of how conventional occupational hazards are being managed. They are not a valid indicator of how well major hazards are managed. When major accidents occur it is often found that the organisation concerned had very low injury rates, arguably indicating that they were managing *conventional* hazards well, but in the aftermath of the accident it becomes clear that *major accident* hazards were not being managed at all well²⁸. As one commentator has put it: “the road to disaster is paved with low and falling injury rates”. In other words, the Commission is quite unjustified in concluding that because the injury rate has halved, so too has the risk of a major accident²⁹.

In summary, the basis on which the Commission concludes that there has been a 50% reduction risk in the UK following the introduction of a safety case regime is weak, and hence the prediction that introducing a safety case regime will result in a reduction of risk by 50% remains largely a guess rather than an evidence-based conclusion.

“Expert opinion based on the best available information”

The conclusion at this point is that the quantitative estimates of cost of major accidents made by the commission underestimate the real cost by a substantial but unknowable amount and the extent to which safety case regulation will reduce the risk of a major accident is little more than a guess. Any attempt to provide a quantitative comparison of benefits and costs is therefore largely futile. All this the Commission acknowledged. Ultimately, it said, its safety case recommendation was based on expert judgement. Here are its words:

“Estimating the effectiveness of the proposed policy options in reducing the probability and therefore the cost of major accidents is a difficult task and can only be made by expert opinion based on the best available information”.³⁰

What then is the best available information? Here is some of the data that the Commission refers to.

²⁵ Fenning N and Boath M. *Impact of the Control of Major Accident Hazards (COMAH) Regulations 1999. Research Report 343*. HSE 2006, p11

²⁶ A p12

²⁷ A p35

²⁸ See for example, Hopkins A, *Failure to Learn: the Texas City Refinery Disaster*. (CCH, Sydney, 2008)

²⁹ The Commission seems to be aware of this point (A p51,52) but does not recognise that it undermines its analysis.

³⁰ IA p44

One indicator of major hazard risk in the petroleum industry is the number of unintended hydrocarbon releases. Such releases are a precursor to a major accident, and hence, reducing their rate reduces the risk of a major accident. The Commission notes that since safety case regulations were introduced in the UK in 1992, “there has been no consistent trend in the number of ‘minor’ hydrocarbon releases ... and that the number of major and significant hydrocarbon releases seems to have plateaued as of 2006/2007 and may even be creeping up again”³¹. The Commission in short, plays down the significance of these data. However the same data reveal that both significant and major hydrocarbon releases have dropped by at least 50% during the relevant period. While one might not want to conclude from this that overall risk has dropped by 50% it would be reasonable to conclude that there has been some reduction in the risk of major accidents.

Table 1 Global Offshore Safety Indicators gathered by the International Regulator's Forum

		Total		Derived Rate		Derived Rate Unit
		Norway	US	Norway	US	
Fatalities and Injuries	Fatalities	2	19	1.68×10^{-2}	4.43×10^{-2}	Per Million Hours Worked
	Major injuries	96	179	8.06×10^{-1}	4.18×10^{-1}	Per Million Hours Worked
	Injuries > 3 days LTI & RWI	147	313	1.23	7.30×10^{-1}	Per Million Hours Worked
	Injuries 1 > and <= 3 days	273	160	2.29	3.73×10^{-1}	Per Million Hours Worked
Collisions and Fires	Major Collisions	1	32	3.60×10^{-3}	2.77×10^{-3}	Per Installation
	Less than major Collisions	0	29	0	2.51×10^{-3}	Per Installation
	Major fires	0	17	0	1.47×10^{-3}	Per Installation
	Less than major Fires	0	32	0	2.77×10^{-3}	Per Installation
Well Control	Major Loss of Well Control	0	7	0	1.25×10^{-3}	Per Well-Related Activity
	Less than major Loss of Well Control	0	13	0	2.31×10^{-3}	Per Well-Related Activity

³¹ A p5

Another relevant piece of information is the data collected by the International Regulators Forum comparing the US with Norway (which operates what is essentially a safety case regime³²), for the years 2007-2009. The data are presented in Table 1³³.

The figures show that loss of well control events and collisions and fires were less likely in Norwegian than in US waters. The fatality rate was also less in Norway than in the US. Injury rates were an exception to this trend, with reported injuries about twice as common in Norway as in the US. However it is well known that reported injury rates are very sensitive to reporting practices, while fatality rates are less so. Be that as it may, the data demonstrate that major accident risk is better controlled in Norway than in the US.

In commenting on these figures, the commission notes that, "different countries and regions have contextual, cultural and historical differences that may affect offshore safety. Nevertheless, ..[the] statistics suggest that objective-based [safety case] regulation in the offshore sector leads to improved safety...". Note that the claim is merely that the safety case regulation leads to improved safety, not that it reduces risk or cost by 50%.

This more modest claim is endorsed by many experts. According to Wilkinson, a former UK safety case regulator, "the near universal opinion of managers and most of the workforce at hazardous installations is that safety cases have been very successful."³⁴ His own experience is that safety case regulation has

- improved understanding hazards and risk
- enhanced knowledge of the technical and managerial controls required to manage them,
- improved oversight by the regulator.

Again, in a paper titled "Has the Safety Case failed?" Fitzgerald and Breen conclude, after an extensive discussion, that "the safety case has not failed. It is still accepted as the most effective way of managing major hazard industries. When properly applied it is indeed effective"³⁵.

Notice that such experts do not claim that safety case regulation will reduce the level of risk by any particular amount. It follows that they cannot have a view on the *extent* of the financial benefit involved beyond concluding that there would indeed be a financial benefit. Strictly speaking, therefore, cost/benefit comparisons based on expert opinion are not possible.

Finally, in view of the fact that the European Commission essentially failed to provide a convincing cost/benefit analysis to justify the introduction of safety case legislation in the EU, it seems unlikely that a convincing cost/benefit argument could be mounted in the United States.

³² From a US perspective this is a reasonable claim, although of course there are differences. For a detailed description of the Norwegian system, see Rosness R & Forseth U. "Boxing and dancing: tripartite collaboration as an integral part of a regulatory regime", Chapter 10 in Baram M and Lindoe (eds) *Risk governance of Offshore Oil and Gas Operations*, Cambridge UP, 2013

³³ A p37. For details of measures, see <http://www.irffshoresafety.com/country/performance/scope.aspx>

³⁴ Wilkinson P, "Safety Cases: Success or Failure", Presentation to the NRCOH, May 2002 p9

³⁵ Fitzgerald B and Breen, "Has the Safety Case Failed?" Paper presented to SPE ,Brisbane, October 2010, p15. See also Haines, Fiona and Platania-Phung, Chris. (February 2010). "Thoughts, feelings, action: survey of Victorian managers of major hazard facilities", 26 *Journal of Health, Safety and Environment* 1, 47-62.

Estimating costs –an aside

Given that the benefits of safety case regulation cannot be adequately quantified, there is little point in seeking to estimate the costs of such regulation, for the purposes of cost/benefit comparisons. Nevertheless, it is worth making a comment here about costs. It is true that safety case regimes require operators to go to considerably greater effort and expense to control major hazards than do prescriptive regimes, such as existed in the Gulf of Mexico prior to Macondo. But post-Macondo, regulations now require operators to implement a Safety and Environment Management System (SEMS). At the heart of this lies a hazard analysis which is not unlike the hazard analysis required in a safety case regime. Let us suppose that an operator complies with this requirement properly, that is, carries out the hazard analysis process conscientiously and implements the necessary risk reduction measures, taking proper account of the hierarchy of controls (designing out hazards, etc). Under these circumstances the additional compliance burden imposed by a safety case regime will be negligible. But experience around the world is that many operators will only comply with such requirements properly, if there is a competent, independent, engaged, well-resourced regulator, actively overseeing compliance and passing judgement on the quality of an operator's hazard analysis and the adequacy of the control measures. For such operators a safety case regime will indeed increase compliance costs. Presumably that is as it should be. In a sense what a safety case regime would do in the US context is *compel* operators to manage the risks as is now required by the SEMS regulation.

Of course, under a safety case regime the regulatory agency itself will cost more, and under most funding arrangements it will be the operators who bear this cost. In this respect a safety case regime will place additional costs on all operators.

But it is important to distinguish compliance costs from regulatory costs in this way, because for operators who are complying as they should be with the requirement to identify, assess and controls risks, the costs of a safety case regime are correspondingly reduced.

Basing the case on values

Given the earlier conclusion about the impossibility of carrying out a proper cost/benefit analysis of the safety case proposal, let us return to the words of the presidential order.

“...Where appropriate and permitted by laws, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts....”

Cass Sunstein took this provision seriously whilst head of the Office of Information and Regulatory Affairs. Indeed he argues in his book that “equity, human dignity, fairness, and distributive impacts” can at times over-ride a simplistic cost benefit analysis. He cites the case of the Department of Transport which wanted to introduce a rule requiring the installation of rear view cameras on new cars to prevent backovers. This would have cost about \$2billion annually and, at around \$9million per life saved, the proposal did not survive the cost/benefit test. However the department argued that 40% of backover fatalities are very young children, run over by their parents, who therefore suffered lifelong anguish. It was impossible to put a monetary value on preventing this anguish, but

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it was something that should be given weight in determining whether the regulation was justified³⁶. Similarly, says Sunstein, a rule requiring that employers provide wheelchair-bound employees access to toilets, though quite unjustifiable in terms of the monetised benefits, might nevertheless be justified on grounds of equity and human dignity³⁷.

Let us therefore consider how safety case regimes might be justified using value-based arguments.

The polluter-pays principle

The polluter-pays principle is based in part on the value of equity or fairness. Specifically, if polluters damage the livelihood of other citizens, it is only fair that they should pay. The Organisation for Economic Cooperation and Development (OECD), of which the United States is a member, describes the principle thus:

"[T]he Polluter-Pays Principle... means that the polluter should bear the expenses of carrying out the pollution prevention and control measures introduced by public authorities in Member countries."³⁸

Interestingly, the OECD has specifically considered the case of accidental pollution from hazardous facilities.

"In matters of accidental pollution risks, the Polluter-Pays Principle implies that the operator of a hazardous installation should bear the cost of reasonable measures to prevent and control accidental pollution from that installation which are introduced by public authorities in Member countries..."

As was pointed out in the European Commission impact assessment discussed above, in cases such as the Macondo oil spill, the full cost can never be known, or even estimated. It follows that the only way in which the polluter pays principle can be implemented in such cases is to prevent the spill in the first place and to make all potential polluters pay.

This is something that OECD statement specifically endorses.

"Public authorities of Member countries that have responsibilities in the implementation of policies for prevention of, and response to, accidents involving hazardous substances, may take specific measures to prevent accidents occurring at hazardous installations and to control accidental pollution. ...[P]ublic authorities may ... introduce specific fees or taxes payable by certain installations on account of their hazardous nature (e.g. licensing fees), the proceeds of which are to be allocated to accidental pollution prevention and control."

Notice that the OECD formulation of the pollution pays principle bypasses cost/benefit hurdle. The principle is that governments have an obligation to prevent major accidents that create massive pollution, with the cost of this preventive activity borne by potential polluters, and that this obligation is not dependent on any calculation of the financial benefit to those who might otherwise

³⁶ Sunstein, op cit, p167

³⁷ Sunstein, op cit, p160, 170

³⁸ OECD Recommendation of the Council concerning the Application of the Polluter-Pays Principle to Accidental Pollution, 7 July 1989 - C(89)88/FINAL .

<http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=38&InstrumentPID=305&Lang=en&Book=False>

have been affected by the pollution. The principle does not allow polluters to argue that the cost to them of preventing pollution outweighs the benefits to those who would otherwise be affected by the pollution.

There is one qualification that might be made to the previous conclusion. There is a sense in which the polluter-pays principle reverses the onus that is placed on proponents of regulation by the cost/benefit analysis requirement. If polluters could identify *all* the costs of their pollution, both direct and indirect, and show that they were less than the cost of safety case regulation, then it would be open to them to argue that they would prefer to compensate all those affected by their pollution rather than have preventive regulatory requirements imposed on them. That would honour the spirit of the polluter-pays principle. However since the full costs of an event like Macondo are unknowable, the point is of academic interest only.

To conclude, therefore, if it is accepted that safety case regimes represent regulatory best practice, then the polluter-pays principle provides a potential justification for the introduction of such a regime in the US.

The issue of multiple fatalities

As noted earlier, one of the most disturbing features of the European Commission cost/benefit analysis is that the life-saving benefits of safety case regimes disappeared from view, because the monetised value of life lost in major accidents was insignificant in comparison to other costs. However, major accidents, when they occur, can result in major loss of life, and any analysis that ignores this fact is intuitively problematic.

Interestingly, Cass Sunstein has much to say about this. In a book written before he became head of the Office of Information and Regulatory Affairs, he devotes considerable attention to disasters, arguing that their cost is not confined to the monetised value of the individual lives lost. Consequently the case for preventing them cannot be based on a conventional cost/benefit analysis.

“Some deaths produce unusually high externalities in the sense that they generate widespread losses, including those stemming from empathy and fear, in a way that leads to predictable pecuniary and nonpecuniary costs”...

For example, “An airplane crash might be especially disturbing because the sudden loss of dozens or hundreds of people seems so unusually and senselessly tragic, in a way that produces large empathetic reactions, or because it signals the further possibility of random, apparently inexplicable events in which large numbers of people die.”³⁹

The consequences can be far-reaching.

“If the social meaning of an airline disaster is that air travel has “become unsafe”, governments may have an obligation to respond with special intensity because the social

³⁹ Cass Sunstein, *Risk and Reason: Safety, Law, and the Environment*. (Cambridge University Press, Cambridge, 2002), p72,73

perception will produce significant social losses in various spheres (including ... net mortality itself, if people shift to more dangerous forms of travel)⁴⁰.

“These considerations suggest that special attention is justifiably devoted to air safety in the time following a crash, even if the relevant precautions do not cause a significant drop in deaths”.

Sunstein gets even closer to the matters at hand in the following passage.

“Special public concern about catastrophic events may thus reflect a judgement that certain kinds of deaths have many harmful effects extending beyond the deaths themselves. Consider in this regard the Buffalo Creek syndrome, documented several times in the aftermath of major disasters. Nearly two years after the collapse of the dam that left 120 dead and 4000 homeless, psychiatric researchers continued to find significant psychological and sociological changes; survivors were characterised by a loss of direction and energy, other disabling character changes, and a loss of communality. One evaluator attributed this loss of direction specifically to the loss of traditional bonds of kinship and neighbourliness. When ordinary people are especially concerned with catastrophes, it may be because they appreciate these points. To the extent that this is so, differences between lay and expert assessments [of the costs of such disasters] rest on genuine value differences (four times as many deaths may be much more than four times as bad) rather than on factual errors in cognitive processes of ordinary people.”

Sunstein’s conclusion that four times as many deaths is much more than four times as bad, is quite widely acknowledged among risk analysts. In fact, one rule of thumb is that 10 deaths occurring together are 100 (10^2) times worse than one death, and a hundred deaths together are 10,000 (100^2) times worse than one death⁴¹. We could easily convert this into monetary terms as follows. Assuming the value of a single life is \$10 million, the value of ten lives lost together is \$1 billion and the value of 100 lives lost together \$100 billion, and so on.

Such a rule of thumb could well make a big difference to cost/benefit calculations. If we recall that there were two accidents in the North Sea prior to the introduction of safety case regimes in the UK and Norway, each with well in excess of 100 fatalities, and none since, and if we attribute this improvement to the introduction of safety case regimes (and not to chance), then the monetised value of life saved becomes an important consideration⁴². Indeed, saving 100 lives is worth a lot more (\$100 billion) than preventing an environmental disaster such as Macondo (\$40 billion).

The preceding rule of thumb is of course little more than that, a rule of thumb, and I am not suggesting here that this be adopted in cost/benefit calculations. It is simply a dramatic way of making Sunstein’s point that multiple deaths affect society far more than the multiple would

⁴⁰ Op cit p74

⁴¹ See Ball D & Floyd P *Societal Risks, Final Report*, <http://www.rpaltd.co.uk/documents/J198-SocietalRisk.pdf> Tweeddale M, 2003, *Managing Risk and Reliability of Process Plants* (Gulf, Amsterdam). p72-3

⁴² A third accident involving major loss of life occurred in Canadian waters in 1982, when the drilling rig Ocean Ranger sank with the loss of 84 lives. EC IA p6. There are also accidents on this scale in less developed countries that are not discussed here because the value of life in those countries may be orders of magnitude less. For further comment on the ethical issues involved in placing a monetary value on life (statistical or otherwise), see my paper on “explaining safety case”, op cit, note 3.

suggest. If a safety case regime in the US prevented even one disaster on the scale of Piper Alpha (167 deaths), that in itself could well be enough to justify the introduction of such a scheme.

Sunstein's argument in relation to multiple fatalities is implicitly still a cost/benefit argument, namely that the benefits of preventing such disasters, although unquantifiable, nevertheless outweigh the costs. The argument does not draw explicitly on any of the values listed in the presidential order. However that list is obviously not intended to be exhaustive, and we could easily formulate the conclusion here as follows. Society places special value on the prevention of large scale loss of life, and safety case regimes can be justified on the grounds that they reduce the risk of such events.

Justice

A final justification for safety case regimes can be based on ideas about justice.

Cost/benefit analysis treats major accidents as chance events, with a probability of occurrence that may vary with circumstances, but which can never be zero, no matter what measures we take.

An alternative view is that every accident is preventable and that major accidents are caused by poor management and, ultimately, corporate negligence which, in many jurisdictions, is criminal. Companies in the UK and Australia are routinely charged and convicted of criminal offences following serious accidents and in the US, when the stakes are high, the Department of Justice brings criminal proceedings. In the Macondo case, for example, BP was charged with and pled guilty to various felony offences, including manslaughter.⁴³

If we view major accidents as criminal incidents rather than chance events, then our perspective on prevention changes. Corporate citizens must refrain from criminal behaviour no matter what the cost. Moreover, human citizens expect their governments to protect them from crime, as a matter of right, not on the basis of a cost/benefit calculation. If the necessary regulatory apparatus imposes additional costs on potential offenders, so be it. That is what justice demands.

Conclusion

The requirement that new regulations be justified on the basis of a cost/benefit analysis has been seen by some as an impediment to the introduction of safety case legislation. The problem is that it is virtually impossible to quantify the benefits of preventing rare but catastrophic events.

However the presidential order that is the basis of the cost/benefit analysis requirement is not inflexible on this matter. It recognises that there may be situations where the benefits are unquantifiable. In such circumstances, advocates of new regulation are invited to make their case on the basis of qualitative arguments about benefits, as well as by appealing to other values, such as equity or human dignity. Cass Sunstein, former head of Office of Information and Regulatory Affairs, has written extensively about what this all means in practice and has provided a number of ideas about how this can be done. This paper has taken its cue from Sunstein to show how various value-based arguments might be made in favour of safety case regulation. In particular, the polluter-pays principle, based as it is on the value of fairness, provides a rationale for supporting the pollution-

⁴³ <http://www.justice.gov/opa/pr/2013/January/13-ag-123.html>

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prevention purposes of safety case regulation, independently of cost/benefit analysis. Again, multiple deaths affect society far more than the multiple would suggest, which means that the economic and social value of safety case regulation in preventing large scale loss of life is far greater than any simple cost/benefit analysis might indicate. Finally, if one views major accidents as criminal incidents, then questions of justice need to be taken into account in ways that cost/benefit analysis fails to do.