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# **Preventing Accidents in Offshore Oil and Gas Operations: the US Approach and Some Contrasting Features of the Norwegian Approach.**

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mbaram@bu.edu) September 2010 ©

[Note: this paper is for Professor Preben Lindoe's project on Robust Regulation. Part 5 will be added for its completion.]

## **Introduction.**

This paper presents an analysis of the legal framework and regulatory approach of the United States (US) for preventing accidents in the development of the oil and gas resources of its outer continental shelf (OCS). It encompasses the legal and regulatory regime prior to the blowout in April 2010 at the Deepwater Horizon drilling rig operated by British Petroleum (BP) and developments following this worst case accident.

The purpose of this paper is to determine how the legal framework influences safety regulation and the safety management practices of companies carrying out exploration and production operations on the OCS. Discussion is focused on prevention of major accidents which harm workers and the offshore and coastal environments, but also deals with some aspects of emergency response.

The analysis does not attempt to assign fault or blame for the BP accident to BP or its industrial partners and contractors, nor to exonerate any of these parties, because these issues are currently being investigated by special commissions, the Congress, and several courts.

Finally, references are made to Norwegian laws and regulations governing oil and gas operations in the Norwegian sector of the North Sea. Norway, with 40 years of OCS experience, is the world's largest offshore oil producer and second largest offshore natural gas producer, and has achieved a high level of safety. The references therefore illuminate a proven alternative approach for preventing OCS accidents.

## **1. Social and Political Context for OCS Operations.**

The US claims more seabed of the OCS than any other nation. For several decades, it has leased portions of this seabed, mainly in the Gulf of Mexico (GOM) and off the south coast of Alaska, to companies for exploration and production of oil and gas resources, and regulated these operations to prevent accidents and harms to workers and the environment. Most of the other regions of the US OCS have been closed to exploitation activities by moratoria enacted by Congress which were stimulated by the 1969 blowout and oil spill at an

Amoco platform off the California coast and the 1988 Exxon Valdez tanker accident and spill in Alaska's Prince William Sound.

Since the 1940's, federal agencies have issued numerous leases and permits to companies for exploration and production activities in regions not covered by the moratoria. According to the Minerals Management Service (MMS), the lead offshore agency since 1982, more than 50,000 wells have been drilled in the federal portion of the GOM since 1947, and in early 2010, there were an estimated 7,000 active leases and 3,600 structures in the GOM providing 97% of all US offshore oil and gas production. [1]

MMS also reports that since the mid-1990's, several factors have encouraged major expansion of deepwater ventures (variously defined as projects conducted in more than 500 or 1000 feet of seawater). These include the depletion of shallow water resources, laws authorizing royalty relief for deepwater leases, studies showing significant resource potential in deepwater regions, and technological advances such as semi-submersible mobile drilling rigs and positioning software. As a result, deepwater OCS oil production surpassed shallow water oil production in 2001, and by 2009, nearly 4,000 deepwater wells had been drilled in seawater depths exceeding 1,000 feet, including 700 in water depths exceeding 5,000 feet. Overall, by 2009, wells in OCS depths exceeding 1,000 feet accounted for 80% of US oil production and 45% of gas production offshore.

These activities provide substantial benefits to the US economy. In 2009, companies working in shallow water and deepwater paid the federal government \$6 billion, and provided 150,000 jobs. Expansion of deepwater operations would provide more of these benefits.

According to a 2006 study by the US Department of the Interior (DOI), 15 billion barrels of deepwater oil and 60 trillion cubic feet of deepwater gas have been discovered and are available for production, with high potential for discovering another 86 billion barrels of deepwater oil and 420 trillion cubic feet of deepwater natural gas. DOI concluded that at current rates of consumption, these actual and prospective amounts would be sufficient to replace all oil imports into the US for almost 25 years and provide for all US gas consumption for more than 20 years. Of these amounts, an estimated 45 billion barrels of oil remain to be discovered in the GOM, 92% of which is in deepwater regions.[2]

Additional benefits from expanding deepwater operations have been claimed, particularly the capture of natural gas hydrates (which are expected to be commercially produceable in the near future), estimated at close to 320,000 trillion cubic feet in deepwater regions of the federal OCS, including more than 7,000 trillion cubic feet in deepwater sediment in the GOM. A former federal official estimates that production of 1% of this resource would generate

payments to the federal government of approximately \$7.5 trillion, and when added to \$4.5 trillion in prospective payments from exploiting the estimated deepwater oil and gas noted above, the total amount “almost completely pays off the current national debt without raising taxes”.[3]

Proponents of expanding deepwater activities claim that in addition to increasing payments and jobs, the operations would provide fuels at low prices, meet growing consumer demand and national energy needs, lead to “energy independence” from unreliable or hostile foreign sources, capture the limited number of deepwater drilling rigs available from global sources, and ensure national security.

Over the last decade, political and public support has grown considerably as prices for oil and gas increased, causing Congress in 1995 and 2005 to enact laws which provide financial incentives for deepwater projects, including suspension of company obligations to pay royalties on production.[4] In 2008, governors of several coastal states and some environmentalists dropped their opposition to offshore drilling, and President Bush ended the long-standing Presidential ban on new OCS leases and urged Congress to end the moratoria which had closed parts of the OCS off the Atlantic coast and the eastern section of the GOM. [5]Although opponents continued to raise concerns about risks in lawsuits and Congressional hearings, a July 2008 poll showed that 74% of the public supported more offshore drilling.[6]

Indications that deepwater activities posed new technical problems, such as those experienced by Chevron at its "Tahiti" site in 4,000 feet of GOM seawater, were countered with many assurances of safety: e.g. that drilling within 200 miles of the US coast "had a 99% safety record", "only .001% of the oil produced had been spilled", and that more oil contamination of the oceans comes from natural seeping, shipping and runoff from land than from oil spills.[7]

Despite some committed opponents, political and public complacency about the risks had set in. On March 31, 2010, President Obama announced a new leasing plan for previously closed regions of the GOM, the Atlantic OCS, and the Chukchi and Beaufort Seas off the northern Alaska coast.[8]

Three weeks later, on April 20, 2010, the devastating accident and uncontrollable spill occurred at the BP drilling rig operating in 5,000 feet of water at the Macondo site in the GOM. This tragic event has caused public outrage, numerous investigations and lawsuits, doubts about industrial ability to safely conduct deepwater operations, and many initiatives to reform the legal and regulatory regime for OCS operations.[9]

## 2. Risks of OCS Operations.

Deepwater and shallow water projects alike pose risks of blowouts, explosions, fires, harms to workers, spills and contamination of ocean and coastal environments, disruption of socio-economic activities, and destruction of corporate facilities and other assets. Spills and environmental contamination have been of most concern to the public because of the Amoco blowout in 1969 and the Exxon Valdez accident in 1989.

The BP blowout and spill, a true worst case scenario, now dominates the public discourse on OCS policy, and has prompted an intense search for risk information for two related purposes: to evaluate the performance of regulatory agencies, operators and contractors prior to the BP accident, and to guide the development of new legislation and regulatory reforms to ensure that future OCS operations will be more safely conducted..

Ongoing investigation of the BP accident itself is a continual source of much useful risk information. The blowout caused an explosion and fire which killed 11 workers on the Deepwater Horizon drilling rig, destroyed the semi-submersible mobile drilling rig leased by BP from Transocean which operated the rig under BP supervision, and ruptured the exploratory well casing at several points. As a result, the uncontrolled release of oil and gas followed, and efforts to stop the release by several methods failed. The release continued at a rate estimated at 40,000 barrels of oil each day for 87 days before a temporary cap on the main release point proved to be successful. Other measures including two relief wells are being advanced at this time to ensure more permanent control.

The spill has contaminated a large region of the GOM and the coastal areas of several states, with severe impacts on wildlife and social and economic activities such as tourism and commercial fishing. Depending on ocean currents and weather, the spill may eventually reach the Mexican coast and parts of the Atlantic coast of the US. Use of chemical dispersants and various means of skimming and containing the spill were of limited value, and the dispersants and oil are creating chemical exposure problems for workers involved in emergency response and mitigation efforts. [10]

Numerous lawsuits are being brought by persons who suffered personal injury, property damage, and economic loss, and state and federal governments are in the process of imposing penalties and other sanctions on BP. Investigations are underway and criminal prosecutions may follow.

Because of this disaster and the scale of its consequences, much attention is now being given to gathering information on OCS risks and the harms that accrued to workers and the environment prior to the BP accident as well as any

analyses of the information by regulatory agencies. This information is needed to develop effective changes in legislation and regulation.

Thusfar, such information is fragmented and incomplete, and indicates that the two agencies with responsibilities for ensuring safety, MMS and the Coast Guard (CG), had not prioritized the systematic collection, evaluation and use of information on near misses, accidents and other aspects of operating experience in the years preceding the BP accident. Doing so would have enabled them to engage with industry in learning processes and continuous improvement of operational safety before the BP accident. At least two reasons for this failure are discussed subsequently in this paper, one being the “regulatory disarray” that has characterized the relationship between MMS and the Coast Guard (CG) on safety matters, the other being their wholesale delegation of safety initiative-taking to industrial organizations such as the American Petroleum Institute (API) without following up on industrial performance.

A month after the BP accident, the Department of Interior (DOI), of which MMS is a regulatory unit, presented a brief summary of risk information regarding blowouts and spills that occurred prior to the BP accident: e.g. that during the expansion of deepwater drilling since 1996, the blowout rate per well had not increased but the number of spills had increased; spills in the GOM were “not major” and those due to blowouts from 1971 to 2010 amounted to some 1800 barrels, with 425 of these being attributable to hurricane damage; and since 1964, only 30.3 barrels were spilled per million barrels produced on the OCS.. It concluded simply that the rate of spills increased since the mid-1990’s as deepwater activities increased, indicating “significant challenges” in preventing a blowout in deepwater. No reference to international experience is made other than mention that major deepwater spills occurred at Ixtoc I off the Yucatan coast in 1979 and Montara in the Timor Sea in 2009.[11] No risk information has been provided by the Coast Guard (CG).

Additional risk information derived from operating experience before the BP accident has also been presented by MMS in announcing its proposed SEMS rule on June 18, 2010.[12] Its intention to enact this “safety and environmental management system” rule was first announced back in May 2006 by a published notice seeking comments. Comments were received but MMS took no further action until prompted by the BP accident four years later.

In proposing SEMS, MMS presented risk information derived from its investigations of accidents and operator non-compliance, performance reviews, and reports on 33 OCS accidents between 2000 and 2007. For the 33 accidents, MMS found that 16 resulted in 14 fatalities and 7 injuries, that one or more of “four functions” were implicated in each accident, along with several “contributing causes”. The functions were hazard analysis, management of

change, written operating procedures, and mechanical integrity; and the contributing causes were lack of communication between the operator and contractors, absence of job hazard analyses or written procedures, supervisor failure to enforce procedures, lack of safe work procedural guidelines, failure to carry out recommended maintenance, and failure to identify or correct workplace hazards.

MMS also presented data on another 1,443 OCS incidents that occurred over the same years. These involved 41 fatalities, 302 injuries, 10 losses of well control, 11 collisions, 476 fires, 356 “pollution events”, and 224 crane and hoist mishaps. It states that the majority of these incidents were related to operational and maintenance procedures or human error, were not related to MMS inspections for hardware compliance, and only 25 were due to safety device failure. It also states that operating procedures and mechanical integrity accounted for the greatest number of spills, without any discernible trend of industrial improvement over the seven year period despite its issuance of some 150 findings of non-compliance per year regarding production and drilling operations. Further discussion of SEMS is presented later in this paper.

Notably missing from its documentation of risk information is any data or insight from the Coast Guard (CG), which shares inspection and other OCS regulatory responsibilities with MMS, or from the American Petroleum Institute which is the leading private group relied on by MMS and CG for setting industrial standards. Also missing is risk information from the insurance sector which provides coverage for offshore operations on the US OCS and worldwide. A hint of what can be culled from the insurance sector is provided by a recent report of the Insurance Information Institute which summarizes data on major OCS accidents and spills around the world. [13]

Nor has MMS presented any risk information from the OCS operations of other countries. This information could illuminate differences in injury, accident and spill rates between countries and provide a basis for investigating possible causes of superior and inferior rates, including the regulatory approach involved as well as various physical, operational, and cultural factors

The potential value of having international information is shown by the results of a recent search by the Wall Street Journal (WSJ) comparing incidents under US and European regulatory regimes. The WSJ found that for each 100 million hours worked during the years 2004–2009, the US incurred 4.84 OCS worker fatalities, more than 4 times the European (North Sea) rate of 1.07 fatalities, with the US injury rate for workers being 23% greater than the European rate. In addition, the US reported 5 major losses of well control in 2007–2008, whereas 5 other major countries (Norway, UK, Australia, Canada, the Netherlands), with about half as much drilling activities, reported no such incidents. [14]



The disparities, according to the WSJ, resulted from over-reliance by US agencies on industrial organizations to develop standards and best practices, the slowness of the industrial response, and the failure of MMS to follow up on industry. One example is provided: that in 2000, MMS asked industry to advise on cementing for well control and spill prevention, and that 10 years later in 2010, the leading industrial standards organization, the American Petroleum Institute (API) acknowledged that it had not yet provided the advice. A footnote to this story should be that a cementing failure is believed to be one of the main causes of the BP accident.

Congressional research staff have also sought risk information regarding harms to workers, but have been frustrated because death and injury reporting systems do not distinguish between onshore and offshore operations. Thus, all that the researchers could report was data for 2009 showing that GOM incidents involved 4 deaths, that 290 injury-causing incidents occurred, and that 145 fires and explosions reported to MMS for that year “may or may not have caused fatalities or injuries”. [15]

It appears that additional information on OCS risks with potential value for improving regulation has been gathered from time to time by MMS but lost in its bureaucracy. A good example is a 1998 study by an MMS consultant on “The Environmental and Safety Risks of an Expanding Role for Independents in the Gulf of Mexico”. This study dealt with concerns that an expanded role for “smaller independents” (companies with assets less than \$500 million) in the GOM would pose greater risks to worker safety and the marine environment because it was assumed they lacked the technical or regulatory skills of “the majors” (the largest oil and gas companies such as BP) or the “large independents” (assets of \$500 million or more).[16]

Using data from MMS “events” and platform inspection files, and regression models to examine the association between accidents and operational and regulatory variables, the study found that independents outperformed majors and that MMS inspections and other factors influence the occurrence of spills. The nominal accident rate per million platform hours was 3.34 for majors, 3.01 for large independents and 2.08 for small independents. Similarly, the weighted accident rate which distinguished between accidents according to their severity was 8.00 for majors, 5.35 for large independents and 3.85 for small independents. Differences between majors and independents measured in spills were found to be “similar but more extreme”, with rates of 255 barrels spilled per million platform hours for majors and 24 barrels for independents.

The study concluded that large and small independents were less likely to have a workplace accident or spill during exploration and production operations than the majors. A cynic may ask whether this MMS-sponsored study was objective or designed to serve an MMS agenda for increasing OCS operations. In any case, it has not been determined if the study was put to any use by MMS and the CG.

Finally, there is another source of risk information, the environmental impact assessment process carried out by MMS and companies seeking OCS leases and permits. This process, with public involvement, is required by the National Environmental Policy Act (NEPA) of any agency intending to take an action which may pose significant threats to the natural and human environments. NEPA requires that full information on the intended action and its possible adverse consequences be developed and the results provided to other agencies and the public for feedback on their concerns and thereby enable the proposing agency to consider the concerns and determine if it should modify its intended action to lessen its impacts or withdraw its intended action.[17] For actions which would permit OCS operations, MMS has also had the opportunity to use the NEPA studies to determine if project design and contingency plans are sufficient to deal with or avoid the impacts and if not, to stipulate conditions it believes necessary. However, MMS performance has been seriously flawed, as discussed later in this paper.\*

Although robust implementation of NEPA can generate useful information for mitigating the potential impacts of a specific project, it usually does not provide technical or operational information that can be used by an agency such as MMS to improve accident prevention. NEPA is directed at the estimation of possible environmental consequences of the agency action that could arise under routine and reasonably foreseeable accidental circumstances, and does not require that worker safety and management systems for accident prevention be addressed. Thus, NEPA does not provide the quality information needed for improving worker safety and accident prevention in OCS operations.

To sum up, at this time risk information on worker safety and accident prevention in the OCS context is very incomplete. Nevertheless, many proposals for new legislation and changes in regulation are being advanced by Congress, DOI and the media, and courts are dealing with several hundred lawsuits. Thus, the context for regulatory reform is highly charged and politicized.

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\* Opponents of agency actions often file lawsuits in federal courts claiming that NEPA studies are substantively deficient. If successful, the result is a court order that requires the agency do a more thorough study to fulfill the NEPA requirement, thereby delaying the agency action until a more complete study or a modified action proves to be acceptable to the opponents or the courts.

### 3. Legal Framework.

The legal framework governing activities on the US OCS is comprised of an uncoordinated collection of numerous laws enacted by Congress over more than 200 years. For example, there are laws which establish jurisdiction over the OCS and federal ownership of its mineral resources, divide authority between the states and federal government over coastal waters and submerged land, and govern harbors, navigation, vessels, pipelines, and fishing. Additional laws protect national security interests, the rights of native American peoples, marine mammals, endangered species, prevent air and water pollution and disposal of toxic waste, require environmental impact studies, and authorize liability for personal injury, property damage, and harms to natural resources.

Within this framework, the law authorizing OCS oil and gas operations is the Outer Continental Shelf Lands Act (OCSLA).[18] This law, frequently amended since its enactment in 1953, authorizes the federal Department of the Interior (DOI) and its MMS unit to conduct OCS leasing programs, issue permits to companies for exploration and production, and carry out a regulatory program to ensure that these activities are safely conducted.. It also authorizes regulation of workplace safety on the OCS by the Coast Guard (CG).

Because Congress has not fully integrated the many laws applicable to the OCS, the framework is not coherent or harmonized. In addition, some of these other laws are implemented by regulatory programs with detailed rules, procedures and decision-making criteria, resulting in a multitude of legally-enforceable requirements that apply to offshore activities. This has made MMS implementation of OCSLA extremely complex.

Even more complexity is created by judicial decisions. Under OCSLA and other laws, agency rules, standards, lease and permit decisions and other final actions can be appealed to a federal court by individuals, companies and other private parties whose interests are impacted. The subsequent judicial review will either affirm the action in question or find it invalid on grounds that it is "arbitrary", lacks a sufficient factual basis, violates procedural requirements, or conflicts with a Constitutional doctrine. Because agency actions are frequently appealed, the courts play a major role in shaping the application of laws and regulations to OCS activities and to OCSLA implementation in particular.

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*In contrast, Norway, the world's largest offshore oil producer and second largest natural gas producer [SOGM], has been working for many years at developing a more coherent, integrated and less complex legal framework for regulating health, safety and environment in the conduct of OCS oil and gas operations. Following a Royal Decree in 2001[19], a comprehensive Framework Regulation [Framework] was enacted and became effective in 2002, and several Ministries developed conforming "common regulations" that year.[20] The Petroleum Safety Authority (PSA) was then created in 2004 to supervise coordinated implementation of the regulations, and a revised and even more integrated version of the Framework Regulation will become effective in January 2011.[21] Facilitating this integration process is the tendency in Norway to resolve conflicts by means other than recourse to the courts, such as by mediation or appeal to higher administrative authority instead. [22]*

*Another difference between the Norwegian and US regulatory regimes is that Norway has allocated leasing and regulatory responsibilities to separate agencies to ensure that regulatory activities are not compromised by leasing programs and goals. Since 2004, the Norwegian Petroleum Directorate (NPD) carries out leasing activities and its prior regulatory function has become the responsibility of an independent agency, the PSA. [23] As noted above, OCSLA vests both responsibilities in the DOI and its MMS unit. But since the BP accident, DOI and Congress are taking steps to separate these responsibilities and allocate them to different newly created agencies, following the Norwegian approach.*

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To return to further examination of OCSLA, this law stipulates that leases and permits are conditional upon company compliance with MMS regulations, other applicable federal regulations, and state laws which are "not inconsistent" with federal law. It also authorizes MMS to suspend activities when health, wildlife or the environment are threatened, and to cancel any lease or permit when such threat is more likely, more serious, and outweighs the advantages of continuation. However, under certain circumstances, cancellation 'shall entitle the lessee to compensation". [24]

With regard to regulating safety, MMS is charged with the duty to "require on all new drilling and production operations, and whenever practicable, on existing operations, the use of the best available and safest technologies which [it]

determines to be economically feasible, whenever failure of equipment would have a significant effect on safety, health or the environment, except where [it] determines that the incremental benefits are clearly insufficient to justify the incremental costs...”. [25]

This reference to a cost–benefit template for deciding whether to require best “available and safest technologies” is a legal requirement which MMS must adhere to, and if it fails to do so when setting a standard or taking other action requiring a safer technology, it is highly likely that the affected operators would seek judicial review and also very likely that the reviewing court would reject the MMS action because it did not meet the statutory requirement.

The OCSLA cost–benefit test for a new regulatory action is reinforced by Presidential directive. Since Reagan, Presidents have directed agencies to justify new regulations by presenting an analysis to the President’s Office of Management and Budget (OMB) which shows that benefits (e.g. fewer deaths and injuries) would exceed costs (e.g. costs of compliance by the regulated industry, costs to consumers, etc.). Although monetizing benefits and discounting future costs and benefits is an arbitrary process, and environmental and safety advocates has strongly opposed such Presidential directives because they restrain agencies from robust regulatory initiatives, agencies like MMS are subject to Presidential management directives and routinely comply. At this time, the prior directive continues in effect because it has not been rescinded by Obama. [26]

OCSLA further provides that any company holding a lease or permit is required to protect the health and safety of workers and contractor employees by complying with occupational safety and health standards, the “general duty” to maintain workplaces free from “recognized hazards”, applicable regulations on health, safety and the environment of other agencies, and additional safeguards required in MMS–approved work plans. Companies are also required to allow agency inspectors access to work sites and relevant records.[27]

Penalties are set forth for non–compliance with lease or permit terms or regulations, for willful and knowing violations, for fraud and falsification.[28] In addition, the law authorizes several types of private lawsuits. Individuals may bring private enforcement actions in federal court against a company or DOI to compel compliance with OCSLA under specified circumstances. Residents of the US may seek compensation for injuries caused by failure of an operator to comply with a regulation. And any aggrieved party may seek judicial review of agency decisions on leases and permits.[29]

OCSLA assigns regulatory and enforcement functions to MMS and the Coast Guard (CG), and specifically provides that OCS workplace safety regulations are to be enforced by the CG. The CG is also directed to conduct scheduled

inspection of safety equipment, periodic unscheduled inspections without prior notice, and investigations of incidents causing death, serious injury, fires, and “major” oil spills (exceeding 200 barrels in a 30 day period).[30]

In doing so, the statute ignores the Occupational Safety and Health Administration (OSHA), which is the workplace safety regulator of onshore oil and gas operations and most other industrial sectors. OSHA has therefore refrained from regulating safety in OCS exploration, production and servicing operations because of the CG role defined by OCSLA and also because the law which empowers OSHA, the Occupational Safety and Health Act of 1970 [31]precludes it from regulating “working conditions of employees with respect to which other Federal agencies...exercise statutory authority to prescribe or enforce standards or regulations affecting occupational safety or health”. [32]

For these reasons, OSHA officially ceded worker safety regulation and enforcement to the CG in several interagency memoranda of agreement years ago, [33] and recently confirmed their unwillingness to get involved in OCS operations, during Congressional hearings that were held in the aftermath of the BP accident.[34] As a result, OSHA expertise and regulations which have been very useful in promoting safety in onshore oil and gas operations, such as its rule on “process safety management,”[35] have not been applied to OCS operations.[36]

In addition, OCSLA does not authorize or even mention worker involvement in the development of safety regulations, industrial standards, inspections, and safety management, providing only that “the Coast Guard...may review any allegation from any person of...a violation of a safety regulation...”[37]As a result, there has been regulatory disregard for safeguarding workers on the OCS, a problem further discussed later in this paper.

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*The Norwegian approach, set forth in the Framework and four “common regulations” of its integrated regulatory regime, addresses many of the same risk issues as OCSLA. However, there are significant differences between the two regimes with regard to the assignment and scope of responsibilities and how they are to be implemented.*

*Norwegian laws and regulations focus on promoting self-regulation by operators by directly requiring each operator to develop and apply an “internal control” system for reducing risks and preventing and responding to accidents, a system which reflects “a sound health, environment and safety culture.”[38] In*

*contrast, the US approach in OCSLA focuses on assigning regulatory responsibilities to several agencies and discusses operators mainly with regard to their duties to comply with the regulations of several agencies and the sanctions they would incur for non-compliance, as discussed previously.*

*Another distinction is that the Framework sets forth in very broad terms the functions that operators should perform for internal control, with accompanying non-binding Guidelines, but without prescriptive details.[39] However, it recognizes that a performance-based, internal control system necessarily leads to operator adoption of industrial standards and compliance with certification requisites of various technical and international organizations.[40] Because this could compromise safety and lead to “business as usual”,[41] PSA has been assigned the critical roles of supervising operator performance of the functions, cooperating with operators and labor unions in problem-solving and addressing new technologies and circumstances, and determining by a consent process when an operator’s approach is suitable.[42] Thus, Norway has created a PSA-managed, non-adversarial approach to building safety systems within each company.*

*In contrast, the OCSLA approach, previously discussed, emphasizes the police function of regulatory agencies, inspections, and the threat of sanctions, thereby creating a legalistic and adversarial relationship between operators and regulators. This is typical of many US laws enacted by Congress with the expectation that agency regulations will be of a “command and control”, detailed and prescriptive nature, and strictly enforced. However, US experience indicates that this approach often leads to low rates of compliance, and agency exemptions and rule-bending to relax overly-detailed prescriptive requirements, as has occurred to some extent under OCSLA. [43]*

*Thus, it is claimed that the Norwegian approach enables operators to quickly adapt internal controls to the dynamics of OCS exploitation, such as technological advance, new site-specific circumstances, and new knowledge about accident prevention without the need for an agency to formally enact new regulations[44], which would be required under the US approach. This allegedly more agile Norwegian approach also produces operator-specific internal controls rather than the generic, “one size fits all” regulations enacted by MMS and other US agencies, a cumbersome, time-consuming process which often leads to judicial review and further delay.*

*However, the US approach is more transparent and publicly-accountable, and is supplemented by the threats of enforcement and sanctions and private lawsuits previously discussed. In addition, operator-specific restrictions can be imposed by MMS and the CG based on their reviews of each operator’s project design and proposed operation, and subsequent inspections. Also, the OCSLA mandate, which does not explicitly call for functional or performance-based*

*regulations nor acknowledge acceptability of industrial standards because of traditional public mistrust and demand for prescriptive rules, essentially forces agencies to publicly provide legal and factual justification for taking such approaches.*

*And in contrast to Norwegian reluctance to threaten operators with enforcement and sanctions for non-compliance with functional requirements, the US approach, at least in theory, uses fear of punitive action as a deterrent against operator violation of rules and standards. Thus, the Norwegian approach relies greatly on trust and PSA supervision and expertise, whereas the US approach reflects mistrust and relies on fear of sanctions and liability.*

*Another fundamental difference involves the regard shown for workers and labor union involvement in addressing safety issues. Norwegian culture, laws such as the Working Environment Act, and the Framework emphasize a tripartite approach to safety which involves labor, industry and government as equal participants in developing regulations, problem-solving and the application of internal controls.[45]*

*This “Nordic OSH regime” in the OCS context is implemented by several collaborative structures within companies: a working environment committee for managers and employees to discuss safety and related issues, election by workers of a safety representative at each worksite, and having occupational safety and health experts on call as consultants to help resolve disputes and provide services to the internal control system.[46]*

*Worker safety representatives play a pivotal role in that they represent employees in safety discussions with agencies and operators, and actively use their authority to halt dangerous work in oil and gas operations and activities, much as they do in other Norwegian industrial sectors. Recent studies find that they are rarely contested by management, force problem-solving, and have a “positive effect” on employee health and safety except with regard to “subcontractor employees who move constantly” between projects.[47]*

*The range of union concerns now extends beyond worker safety and labor issues. The Norwegian Federation of Trade Unions has recently decided to expand the scope of its interests and advocacy beyond worker safety to encompass environmental and sustainability issues in negotiating collective agreements with industrial groups, topics it had previously neglected. [48]*

*There is continuing concern expressed by labor unions and safety advocates that the Nordic OSH model for OCS operations will be undermined by several developments: operator adoption of industrial standards for internal control, an increase in operators from countries that show less regard for workers and unions, market forces which lead operators to increase hiring of temporary*



*workers, and management application of behavior-based approaches to the workforce.[49]*

*Of special concern to unions is operator use of methods for changing worker behavior, which many in industry instinctively turn to as a means of reducing injuries and accidents instead of making more costly improvements in facilities and operations.. The union view is that this approach, now being promoted in the “Step Change” project in the United Kingdom OCS, is based on discredited studies by DuPont, insurers, and others, shifts the burden of safety from management to workers, mistreats and demeans workers, undermines unions, and violates the Norwegian Working Environment Act.[50]*

*Nevertheless, workplace safety and union involvement, although vulnerable to these trends, are fully integrated into the Norwegian approach to accident prevention and internal control systems. In contrast, the limited presence of unions in US OCS operations and the US approach under OCSLA, previously discussed, has resulted in a complete failure to provide these features in regulating OCS operations.*

*Finally, there is a subtle difference between Norwegian and US approaches on the matter of adhering to cost-benefit analysis (cba) when determining the level of safety to be provided. As previously discussed, OCSLA and Presidential directives have firmly established cba as the regulatory basis for deciding “how safe is safe enough”, and MMS and the CG have diligently complied.*

*The Norwegian approach is more ambiguous and less doctrinaire. The Framework provides that an operator shall prevent harms in accordance with applicable laws, its own internal control, and PSA acceptance criteria, and “Over and above this level the risk shall be further reduced to the extent possible.” The same provision then modifies “to the extent possible” by adding that “in effectuating risk reduction”, the operator is to choose “solutions” which “offer the best results, provided the associated costs are not significantly disproportionate to the risk reduction achieved.” [51]*

*In addition, several sections of the “common regulations” deal with risk reduction functions in terms that also avoid imposing a strict cba test. For example, the Facilities Regulations provided, in part, that facilities “shall be designed so that ...b) the major accident risk becomes as low as practically possible...”[52] However, according to an industry representative, the word “practically” will be officially deleted, a change opposed by industry because the resulting “as low as possible” test for facility safety would be a more stringent requirement.[53]*

*Thus, a strict cost–benefit test is avoided,, making operators accountable for reducing risks to the extent they can be reduced, so long as the costs do not significantly outweigh benefits. Working this out in actual practice poses a challenge for PSA supervision. Nevertheless it affords a more robust approach to safety than the US approach.*

*The Norwegian approach to safety offshore presents a very interesting progressive alternative which asks much more of operators than the mechanistic regulatory compliance approach of the US. Prior to enactment of its integrated approach in 2002, Norway experienced several OCS accidents causing fatalities and spills: e.g. Bravo blowout in 1977, West Vanguard gas blowout, Alexander Kjelland capsized and deaths, and Bronneysund transport accident and deaths. However, since 2002, no such accidents have occurred and the Snorre near miss incident has been studied to develop improvements in internal control.*

*There are many compelling reasons to reform the US approach. A serious attempt to do this must involve thorough consideration of the Norwegian approach.*

#### **4. Regulation.**

Regulation of OCS oil and gas activities must be done in accordance with the directions provided by OCSLA. Most of the directions regarding permits and the safety of operations are briefly stated in broad terms. Thus, MMS has had considerable discretion in making permit decisions, designing rules, and setting standards, and the CG has similarly had discretion in regulating workplace safety.[54]

In the aftermath of the BP accident, MMS has been replaced by a new Bureau of Safety and Environmental Enforcement (BSEE). [55] BSEE inherits the regulatory program built by MMS over 30 years and will undoubtedly modify the MMS program to correct weaknesses. However, it will have to carry out the same basic regulatory functions mandated by OCSLA. Although OCSLA itself may be amended by Congress, Congressional and Presidential proposals thusfar have not recommended changes to the basic regulatory functions. Thus, it is instructive to consider aspects of MMS performance that need to be improved upon by BSEE, and to also consider the role played by CG.

The basic regulatory functions of the MMS regulatory program include:

- (1) enacting or incorporating by reference the rules, standards, and practices for governing OCS exploration and production operations, as well as OCS pipelines, to ensure safety and efficiency;
- (2) conducting several reviews to ensure that proposed operations and facilities will comply with these regulations and then issuing permits; \*
- (3) conducting post-permit inspections to ensure that compliance is being maintained throughout operations;
- (4) enforcing and imposing sanctions for non-compliance, and
- (5) participating in CG coordination of activities in response to accidents and spills.

The scope of the MMS regulatory program to be inherited by BSEE has therefore encompassed virtually all aspects of OCS permitting, drilling, production and contingency management. [56]

The program has some distinctive features. One is that most of the MMS and CG rules and standards are prescriptive rather than performance-based. Another is that many of these were adopted from or incorporate by reference industrial standards and recommended practices originally developed by the American Petroleum Institute (API) and several engineering societies and private standards organizations.

Another feature is that the inspection function, according to MMS, is conducted “to enforce operator compliance” with regulations. As described by MMS, this has involved announced and unannounced inspections, reviews of an operator’s compliance documentation, providing regulatory compliance training to rig managers, and performing safety inspections “on behalf of the U.S. Coast Guard”. Its summary of what inspectors have looked for consists of checklists for numerous “Potential Incidents of Non-Compliance” (PINC’s), which for example include 160 PINC’s for a drilling rig, and other “verifications” that detailed technical requirements are being met. For workplace safety, it has conducted, on behalf of the CG, “a general safety walk-through of the facility looking for general housekeeping hazards related to slips/trips/falls/railings/open gratings”. [57] Several thousand inspections were carried out in 2009 at 331 well sites in the GOM. [58]

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\* The pre-permit reviews involve environmental, engineering, design and financial responsibility evaluations of applications for permits, and include, for example, applying design specifications for blowout prevention and well control, and other standards for equipment and operational procedures. The agency has also added special requisites as stipulations to permits when necessary for safety and spill control, and required deepwater operations plans and additional information on mobile platforms for special evaluation.

This type of highly prescriptive, compliance-oriented regulatory program is common in the U.S. It is the cultural construct of a society in which free-market values compete with public demands for safety and holding companies accountable, where industry and regulators are viewed as adversaries because companies are expected to be opportunistic and agencies are expected to prescribe and police their behavior, where companies lobby against new “burdensome” regulations and agencies are under constant pressure from industry, states, Congress and the President to be accommodating to business and other economic interests yet somehow prevent harms. The problems that arise from this type of regulation are apparent in several regulatory sectors, for example in the regulation of financial services, auto and air transport, food and drug products, and the extractive industries which include hard and soft (oil and gas) minerals mining.[59]

In theory, the regulatory program built by MMS has its merits, but like any regulatory approach, it requires robust implementation for credibility and success. Since the BP accident, implementation of this program has been critically evaluated and there is now ample evidence that agency performance over the last decade deteriorated in several respects. *The following discussion focuses on some of these deficiencies in order to derive “lessons learned” that may be of value to BSEE, and is not intended to exonerate BP or any other OCS operators and contractors.*

#### Assessing and Using Environmental Impact Studies.

Since enactment of the National Environmental Protection Act (NEPA) in 1969, federal agencies must consider the environmental impacts of their intended actions, as previously discussed. The purpose is to have the agencies acquire knowledge of environmental features likely to be adversely affected and to use this knowledge to modify their actions in ways which will avoid or mitigate the potential impacts. MMS has routinely complied with NEPA for its intended lease sales, but developed a “categorical exclusion” policy exempting exploration permits, claiming that the subsequent drilling operations would not incur major spills or cause other significant impacts. By exempting exploration, MMS avoided the delay and resource commitments involved in conducting, disseminating, reviewing and defending environmental impact studies, and expedited permitting and exploration. By doing so, it willfully gave away the opportunity to acquire information that would have enabled it to stipulate appropriate spill control and emergency response requirements in permits as precautionary measures.[60]

Because the BP permit had been categorically excluded, this MMS policy has been attacked as a cause of the vast environmental damage that ensued.

Although the agency had previously done three environmental studies for its GOM 5 year leasing plan, its combined lease sales in the GOM, and its lease sale to BP, these were broader, less detailed with regard to specific site conditions and operational features, and thereby less useful in addressing the potential impacts of a BP blowout and major spill at the deepwater Macondo site and the adjacent coastal region.

MMS apparently allowed its “production” role as lessor and expeditor of deepwater drilling, as defined by OCSLA and promoted by political forces, to overwhelm its environmental protection role. As previously discussed, these roles will now be carried out by separate agencies. In addition, it is expected that its successor, the BSEE, will require more thorough compliance with NEPA, more precautionary estimates of spill potential and impacts, and restrict use of categorical exclusions for deepwater permits.[61] The generic lesson is that agencies, like companies, have a tendency to emphasize production at the expense of safety in U.S. regulatory culture, even when they have no explicit legal mandate for production, and that continuing independent oversight is needed to ensure their robust performance of safety responsibilities, similar to that exercised by PSA in Norway.

#### Reliance on Industry Standards.

MMS and CG delegated many of their regulatory responsibilities to industrial and technical organizations, especially the American Petroleum Institute (API), by adopting or incorporating by reference their voluntary standards and recommended practices, or otherwise accepting them as consensus standards. This was done for the good purpose of drawing on the technical, experience-based safety expertise of these organizations and their research resources. But it was also done for some less salutary reasons, and over time, this reliance has contributed to the deterioration of in-house expertise at the agencies, which has been highlighted in recent studies of their performance. As a result, the agencies allowed the industry to determine the progress and quality of safety regulation to a considerable extent.

For example, MMS had accumulated data over many years linking most accidents to inadequate company performance of four of the 12 safety management functions\* set forth in API’s Recommended Practice 75, as previously discussed. RP-75 broadly covers the major features of safety and environmental management systems for OCS operations, and is known as API’s SEMP rule. It was enacted in 1993, and company compliance has been voluntary.[62]

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\* According to MMS, the 4 functions implicated in most accidents were hazard analysis, management of change, written operational procedures and mechanical integrity, and their inadequate performance was due to poor communications, failings in supervision and maintenance of operations, and uncorrected workplace hazards

Even though MMS had such accident data and found no trend towards accident reduction over several years, it continued to rely on voluntary compliance with SEMP until the BP accident when it hurriedly proposed its own rule to compel company performance of the four functions.[63] This case and others illustrate MMS deferral to industry on safety management and its failure to maintain oversight and take the steps needed to prevent continuation of certain accident-causing activities.[64]

The CG for many years has refrained from enacting its own rules and standards for OCS workplace safety but has referenced, and claims to enforce, hundreds of industrial and technical standards.[65] As previously discussed, OCSLA's assignment of workplace safety responsibilities to the CG has had the legal effect of precluding the more expert OSHA from this role. [66]

In an article published shortly before the BP accident, the recently retired chief of CG's Office of Standards Evaluation and Development stated that "our efforts today are guided by OMB Circular A-119" which "directs agencies to use voluntary consensus standards in lieu of government-unique standards, except where inconsistent with law or otherwise impractical" and thereby reduce government-unique standards "to a minimum" in order to eliminate costs to the government, encourage economic growth and promote economic competition. As a result, CG has adopted some 450 industrial standards which "saves potentially thousands of pages of federal regulations" and "saves the Coast Guard over \$1.5 million annually".[67]

According to a post-BP accident article, CG worked at removing what it considered to be barriers that impede productivity and commerce. However, interviewed officials acknowledged that their oversight of rigs should have been more rigorous, that "the pace of technology has outrun the current regulations", and that they had inspected BP's Deepwater Horizon rig 9 times without finding any "major issues".[68] In addition, CG also transferred its workplace inspection responsibilities to MMS.[69] Refraining from developing its own regulations and relying on others to develop standards and safeguard workers have taken their toll on CG expertise.

At Congressional hearings in 2007[70], CG was depicted by several witnesses as having a semi-military, command and control culture, failing to build in-house expertise because of its policy of rotating junior level officers throughout several of its missions, and being insensitive to the circumstances of employees in business organizations. The Gulf Coast Mariners Association, created by four labor unions, testified that CG "marginalized" workers by relying exclusively on managers for information, has too little experience in civilian marine activities, fails to enforce injury reporting requirements, and has not regulated workplace

safety in a manner comparable to OSHA regulation of other workplaces. The Association recommended transferring CG's workplace safety functions to a civilian agency.

Reliance on industry standards and practices must be carefully supervised to avoid several types of problems: to prevent deterioration of the agency's technical competence, to prevent industry takeover of the agency so that its program does no more than accommodate "business as usual", to ensure that the agency's mandate for safety is robustly pursued and attentive to the concerns and information of value that can be provided by workers, unions, and environmental organizations.

But more than supervision is needed. Steps must be taken to ensure the integrity and objectivity of the industrial and technical organizations that agencies look to for expertise. Consider that API, which has developed some 500 standards and practices, many of which have been adopted by MMS and CG, also spends millions annually to aggressively lobby and coordinate campaigns against new laws and regulatory initiatives to improve safety because of its members' opposition to bureaucracy and additional costs. [71] Consider that API and others do not invite the participation of unions and workers who often have intimate knowledge about inadequate safety practices and gaps in safety management which could help reduce accident risks.[72]

Consider further that API and other industrial organizations which supplied MMS and CG with sub-optimal standards and practices, failed to ensure that voluntary practices were being followed, and in many cases failed to address known risks and new safety measures, remain unaccountable for harmful consequences. These issues need to be addressed in the investigation of agency reliance on industrial standards which has recently been launched by leaders of the new Bureaus which replaced MMS. [73].

#### Inspection of Operations.

According to MMS and CG, the main purpose of their inspection programs has been to ensure and enforce compliance with numerous rules. MMS claims that its inspection program has been comprehensive and in the GOM in 2009, for example, it conducted some 561 drilling inspections, 3678 production inspections, 3342 "personal safety" inspections (many for the CG), and many other inspections as well. [74] As discussed earlier, Inspectors have used a "national checklist" called the Potential Incidents of Noncompliance list which is a compilation of yes/no questions addressing operator compliance with all applicable regulations. [75] Upon detecting a violation, MMS has notified the operator and if the violation remains uncorrected and is "severe", has imposed sanctions such as "shut-ins" and monetary penalties.

Thus, its approach to inspection reflects an extreme form of proceduralization, i.e. the reduction of the complexities of safety management to a simplistic standardized checklist format for the purpose of policing operator compliance with many prescriptive rules. This raises the questions of its efficacy, and whether it deprives the inspection function of a more holistic appraisal of safety management in real time practice, and the agency's ability to determine if the behavioral, technical and organizational aspects of safety management converge to create a healthy safety culture at each facility. [76] Put another way, has MMS been missing the forest by focusing on each of the trees?

As discussed earlier in this paper, MMS has acknowledged that there has been no discernible improvement in the reduction of accidents, fatalities, injuries, loss of well control, fires and spills over a studied seven year period in which it issued each year some 150 findings of non-compliance in GOM operations. In addition, several investigations have found that both MMS and CG have had problems in hiring and retaining staff with sufficient technical expertise for overseeing and inspecting sophisticated operations and questioned the technical capacity of the agencies in this regard. [77] Federal investigators have also verified that MMS had been an inconsistent and compromised performer of inspection and other functions in some cases because members of its staff had "inappropriate relationships" with industry personnel, including gift-taking and sexual relationships, and questioned whether its oversight activities were sufficient to ensure safe operations offshore. [78]

Finally, there is the issue of jurisdictional ambiguity. At hearings recently held by a Congressional committee, presentations by Coast Guard, Department of Interior and OSHA officials were made defining their regulatory and inspection roles offshore. Considerable confusion arose because their jurisdictional boundaries were shown to be ambiguous and arbitrarily defined and with some apparent conflicts, causing confusion among the Congressional committee members. For example, the CG claims responsibility for mobile drilling rigs and BSEE (as with its MMS predecessor) claims responsibility for fixed platforms, But CG is also responsible for workplace safety on fixed platforms with MMS responsible for what occurs below the platforms. OSHA's responsibility for what is unregulated and unenforced by CG and MMS/BSEE is therefore highly uncertain. The chairman of the committee called this regulatory disarray a "jurisdictional mishmash" and the absence of OSHA's process safety management rule a critical shortcoming. The hearings will continue to explore this state of confusion which obviously impairs the inspection function and its efficacy for safety. [79]

Thus, there are lessons to be learned from MMS experience about the conduct of a compliance-oriented inspection program, such as its vulnerability when staffed by under-qualified inspectors, confused by jurisdictional ambiguities, or compromised by ethical lapses. But much larger questions need to be



considered as BSEE assumes direction of the regulatory program regarding the efficacy of compliance-based inspection of complex industrial activities for accident prevention, and the efficacy of alternative approaches in which the inspector's role would involve a more holistic appraisal of activities at a facility and trust-building educative functions. [80]

#### More Issues to Consider.

Through the lens of safety science, deeper issues can be discerned and should provide the foundation for reforming offshore regulation and safety management. The field of safety science is interdisciplinary and is populated by practitioners in industry and government, consultants and academics. Their activities reflect a convergence of behavioral and organizational specialists with technical and legal counterparts and produce insights, many of which have eventually been recognized and adopted by regulatory and industrial safety programs.

One such insight is the concept of "drift", developed by Jens Rasmussen,[81] which provides that the efficacy of a regulatory program or safety management system deteriorates as operations move outside the envelope of conditions and circumstances it was originally created to deal with. This is a common occurrence and is often not recognized until a major accident occurs. In the case of the MMS regulatory program, its continuing application to operations moving into deeper waters and using new facilities (such as mobile, semi-submersible drilling rigs) has led to the BP accident and other deepwater incidents. Even though MMS added requirements for deepwater and mobile rigs to its permits, these were "add-ons" and not fully integrated into the regulatory program.

Another insight that seems relevant to MMS, in retrospect, is the concept of legitimization or normalization of deviance, as developed by Diane Vaughan. [82] This concept provides that many small behavioral and technical deviations e.g. "short cuts") commonly occur over time within a regulatory program or safety management system without being addressed. Eventually, the new norms can undermine the program or system to the point where it is incapable of preventing certain types of accidents. In the case of MMS and CG, many deviations regarding their review and inspection procedures, as discussed previously, seem to be implicated in the accidents that have ensued in recent years. It should be noted that when a prescriptive regulatory program deteriorates in this way, it is inevitable that company safety management system will also deteriorate.

Finally, there is the Norwegian concept, set forth in its Framework regulation,[83] that regulation should be directed towards building company self-regulation in the form of internal controls, rather than being used as a policing program to enforce non-compliance with many detailed rules. In the

case of MMS and CG, it is becoming apparent that their prescriptive policing approach did not lead to a coherently organized and supervised internal control system on the Deepwater Horizon rig leased by BP. Investigations of the BP accident reveal the management disarray on the Deepwater Horizon that prevailed and contributed to the accident, a disarray between BP, the lessor, Transocean, and the major contractors regarding equipment and pressure testing, cementing, and other matters.

The failure of a prescriptive regulatory approach to build coherent, competent and integrated facility operations management should be a major consideration as reforms of the MMS program are made. Dealing with this very critical issue inevitably leads to consideration of the self-regulatory approach being pursued by Norwegian authorities and the question of its viability in the U.S. cultural and regulatory context, to be discussed below.

## **5. The Self regulation Option.**

(to be inserted)

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