Part III

Lessons Learned: Industry, Government, Energy Policy

The private oil and gas industry is the lead actor in exploration and production of Gulf energy resources. In the wake of the BP *Deepwater Horizon* disaster—a crisis that was unanticipated, on a scale for which companies had not prepared to respond—changes in safety and environmental practices, safety training, drilling technology, containment and clean-up technology, preparedness, corporate culture, and management behavior will be required if deepwater energy operations are to be pursued in the Gulf—or elsewhere. Maintaining the public trust and earning the privilege of drilling on the outer continental shelf requires no less. As Chapter 8 explains, some of the required responses are under way; for other measures, there are useful precedents from other industries. Beyond the oil and gas industry's response, the inadequacies in permitting and regulatory standards, practices, and oversight revealed by the crisis have already caused significant changes in the federal rules and procedures for deepwater drilling. But further action, including the creation of an independent safety authority, is clearly warranted, as described in Chapter 9.

Finally, the interplay of public incentives, security considerations, energy conservation and use, and alternative energy sources, among other factors, will shape future deepwater drilling in the Gulf and in other frontier areas, as discussed in Chapter 10. Because some of those frontiers are defined by greater well depths and pressures, and others are in settings as yet untapped (the Arctic, in particular)—with economies, environmental resources, and community characteristics different from those tested so severely in and along the Gulf Coast—learning the right lessons from the BP *Deepwater Horizon*, and adapting them to different contexts, must thoroughly inform the future of America's offshore oil policy.

Chapter Eight
"Safety is not proprietary."

Changing Business as Usual

The *Deepwater Horizon* blowout, explosion, and oil spill did not have to happen. Previous chapters have explained the immediate and root causes for why they nonetheless did. The American public, government, and the oil and gas industry need to understand what went wrong so they can pursue the changes required to prevent such devastating accidents from recurring.

This chapter examines how petroleum companies have been managing the risks associated with finding and producing oil and how they can do it better, individually and as a responsible industry overall. The record shows that without effective government oversight, the offshore oil and gas industry will not adequately reduce the risk of accidents, nor prepare effectively to respond in emergencies. However, government oversight, alone, cannot reduce those risks to the full extent possible. Government oversight (see Chapter 9) must be accompanied by the oil and gas industry's internal reinvention: sweeping reforms that accomplish no less than a fundamental transformation of its safety culture. Only through such a demonstrated transformation will industry—in the aftermath of the *Deepwater Horizon* disaster—truly earn the privilege of access to the nation's energy resources located on federal properties.

Even as Deepwater Horizon burns, oil from the blown out well begins to spread across the Gulf. Preventing such disasters in the future will take more effective government oversight. Most crucial, however, will be the oil and gas industry's commitment to fundamentally transform its own safety culture.

< Gerald Herbert/Associated Press

Offshore oil and gas exploration and production are risky. But even the most inherently risky industry can be made much safer, given the right incentives and disciplined systems, sustained by committed leadership and effective training. The critical common element is an unwavering commitment to safety at the top of an organization: the CEO and board of directors must create the culture and establish the conditions under which everyone in a company shares responsibility for maintaining a relentless focus on preventing accidents. Likewise, for the entire industry, leadership needs to come from the CEOs collectively, who can apply pressure on their peers to enhance performance.

Properly managed, the presence of risk does not mean that accidents have to happen. As Magne Ognedal, Director General of Norway's Petroleum Safety Authority, put it: "risk must be managed at every level and in every company involved in this business. . . . In this way, risk in the petroleum sector can be kept at a level society is willing to accept. And we can reduce the probability that major accidents will hit us again."[1]

BP's Safety Culture

BP has proclaimed the importance of safety for its vast worldwide operations. "Our goal of 'no accidents, no harm to people and no damage to the environment' is fundamental to BP's activities," stated the company's Sustainability Review 2009. "We work to achieve this through consistent management processes, ongoing training programmes, rigorous risk management and a culture of continuous improvement." It added that "creating a safe and healthy working environment is essential for our success. Since 1999, injury rates and spills have reduced by approximately 75%."[2]

Yet despite the improvement in injury and spill rates during that decade, BP has caused a number of disastrous or potentially disastrous workplace incidents that suggest its approach to managing safety has been on individual worker occupational safety but not on process safety. These incidents and subsequent analyses indicate that the company does not have consistent and reliable risk-management processes—and thus has been unable to meet its professed commitment to safety. BP's safety lapses have been chronic.

Safety Culture

The United Kingdom Health and Safety Executive formally defines the **safety culture** of an organization as "the product of individual and group values, attitudes, and perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organisation's health and safety management." A more popular description is that safety culture means doing the right thing even when the no one is watching. There are two kinds of safety: **occupational safety**, which refers to keeping people safe, and **process safety,** which refers to the procedures for minimizing risk more generally.

Refinery accidents. Between May 29 and June 10, 2000, BP's Grangemouth Complex on Scotland's Firth of Forth suffered three potentially life-threatening accidents: a power-distribution failure leading to the emergency shutdown of the oil refinery; the rupture of a main steam pipe; and a fire in the refinery's fluidized catalytic cracker unit (which turns petroleum into gasoline).[3] The U.K. Health and Safety Executive investigated the incidents. About the power loss, it said: "Subsequent investigations revealed a number of weaknesses

in the safety management systems on-site over a period of time which contributed to the succession of events that resulted in the power distribution failure."[4]

It made virtually the same comment about the other two incidents.[5] The Executive's wider conclusions included:

- "BP Group policies set high expectations but these were not consistently achieved because of organisational and cultural reasons;
- "BP Group and Complex Management did not detect and intervene early enough on deteriorating performance;
- "BP failed to achieve the operational control and maintenance of process and systems required by law;
- "The BP Task Force findings and recommendations properly addressed the way forward to ensure safe and reliable operations at the Complex."[6]

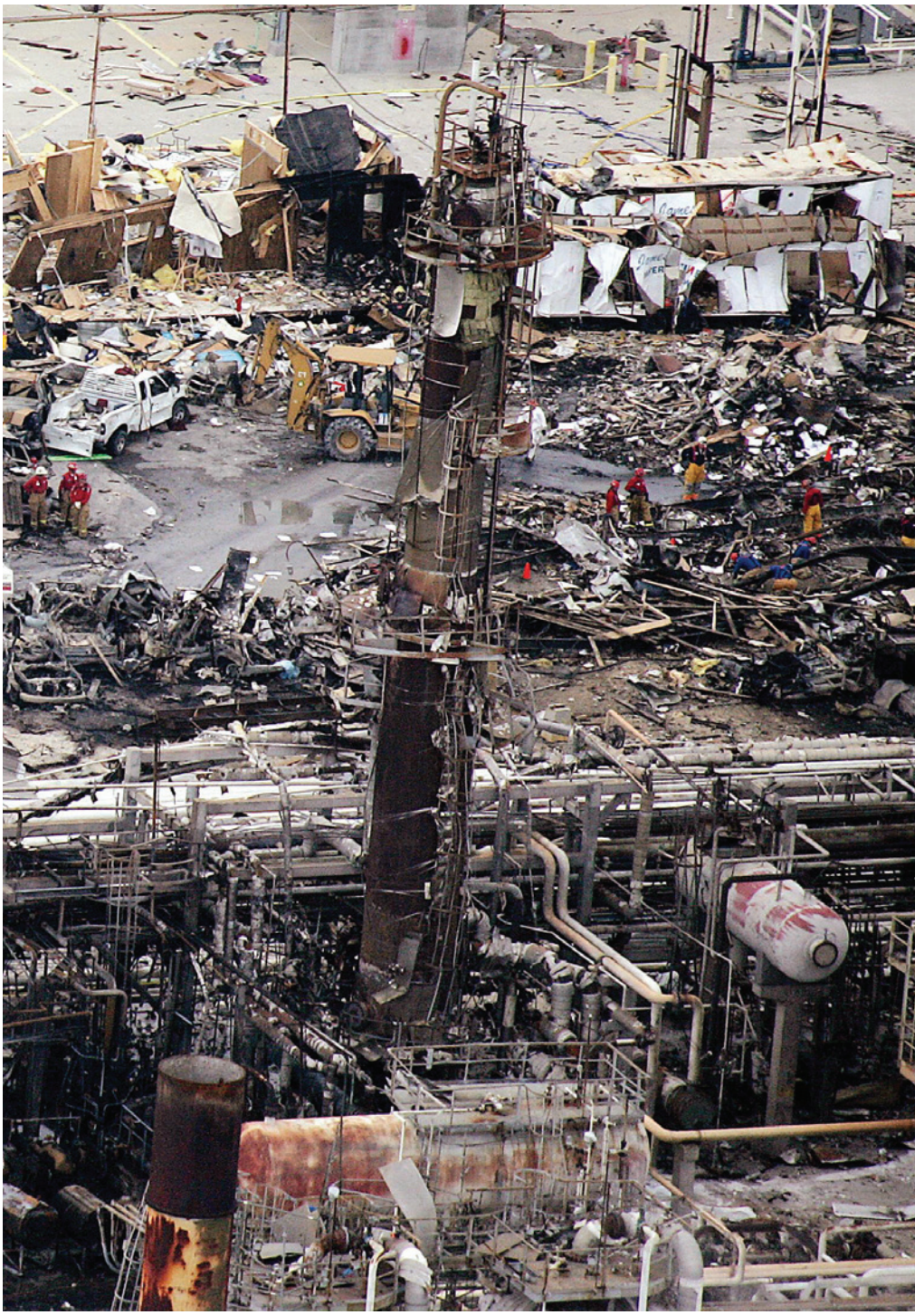
North Sea platforms. It was not only BP's refineries that had problems. In November 2003, a gas line ruptured on BP Forties Alpha platform in the North Sea, flooding the platform with methane. It was a windy day and there was no spark to ignite the gas,[7] so the platform avoided the fate of the Piper Alpha (operated by Occidental Petroleum), where a blown gas line led to explosions that killed 165 crew members and 2 rescuers in 1988 (see Chapter 3).[8] BP admitted breaking the law by allowing pipes to corrode on the Forties Alpha and paid a $290,000 fine.[9]

On the platform that Thursday, November 27, 2003, was a BP engineer named Oberon Houston, who later resigned from the company. He told the Commission that BP focused heavily on personnel safety and not on maintaining its facilities. He added that BP was preparing to sell the depleted field, and was running it at minimum cost: "The focus on controlling costs was acute at BP, to the point that it became a distraction. They just go after it with a ferocity that is mind-numbing and terrifying. No one's ever asked to cut corners or take a risk, but it often ends up like that."[10]

The Texas City refinery explosion: a deficient safety culture. On March 23, 2005, a blast at BP's Texas City refinery—the third largest refinery in the United States—killed 15 people and injured more than 170.[11] A U.S. Chemical Safety Board report on the Texas City refinery explosion found a recurring pattern. It concluded that "BP Group did not systematically review its refinery operations and corporate governance worldwide to implement needed changes identified in the Health and Safety Executive report and in its own Task Force report, even though the Group Chief Executive told staff in October 2000 edition of BP's in-house magazine that BP would learn lessons from Grangemouth and other incidents."[12]

Testifying in 2007 about the Texas City event before a U.S. Senate Subcommittee, Carolyn W. Merritt, Chairman and CEO of the Chemical Safety Board, described the equipment that caused the blast as "1950s-era" and "unsafe," and stressed that it was equipment that "many companies around the world ha[d] long since eliminated. . . ."[13] Merritt added that BP had in fact considered eliminating the equipment in 2002, which had by then already

Explosion at BP's Texas City Refinery



BP is no stranger to serious accidents. In March 2005, an explosion rocked the company's Texas City refinery near Houston; 15 workers lost their lives. One year later a BP pipeline on Alaska's North Slope ruptured, spilling more than 200,000 gallons of oil onto the fragile tundra. Yet, the report notes, in recent years the company's safety record in the Gulf of Mexico has been excellent.

William Philpott/AFP/Getty Images

resulted in "a number of serious releases," but had ultimately declined to do so "[f]or a variety of reasons—including cost pressures" and BP's ability to take advantage of "the existence of an exemption under [U.S. Environmental Protection Agency] air regulations. . . ."[14]

The Safety Board's report on Texas City noted that "while most attention was focused on the injury rate, the overall safety culture and process safety management program had serious deficiencies. Despite numerous previous fatalities at the Texas City refinery (23 deaths in the 30 years prior to the 2005 disaster) and many hazardous material releases, BP did not take effective steps to stem the growing risks of a catastrophic event."[15] The report added: "Cost-cutting and failure to invest in the 1990s by Amoco (who merged with BP in 1998) and then BP left the Texas City refinery vulnerable to a catastrophe. BP targeted budget cuts of 25 percent in 1999 and another 25 percent in 2005, even though much of the refinery's infrastructure and process equipment were in disrepair. Also, operator training and staffing were downsized."[16]

The Safety Board further singled what it characterized as the "organizational causes embedded in the refinery's culture," including:

- "BP Texas City lacked a reporting and learning culture. Reporting bad news was not encouraged, and often Texas City managers did not effectively investigate incidents or take appropriate corrective action.
- "BP Group lacked focus on controlling major hazard risk. BP management paid attention to, measured, and rewarded personal safety rather than process safety.
- "BP Group and Texas City managers provided ineffective leadership and oversight. BP management did not implement adequate safety oversight, provide needed human and economic resources, or consistently model adherence to safety rules and procedures.
- "BP Group and Texas City did not effectively evaluate the safety implications of major organizational, personnel, and policy changes." [17]

At the Chemical Safety Board's instigation, BP established its own independent panel to review its safety procedures and find ways to improve them.[18] That panel, chaired by former U.S. Secretary of State James Baker III, issued its report a few months before the Chemical Board report in 2007. The Baker panel was no more charitable in its assessment. The panel found that BP management had not distinguished between occupational safety—concern over slips, sprains, and other workplace accidents—and process safety: hazard analysis, design for safety, material verification, equipment maintenance, and process-change reporting. And the panel further concluded that BP was not investing leadership and other resources in managing the highest risks.[19]

The Baker panel especially faulted BP for failing to learn the lessons of Grangemouth by repeating them in the events leading up to the Texas City refinery explosion. According to the panel, "in its response to Grangemouth, BP missed an opportunity to make and sustain company-wide changes that would have resulted in safer workplaces for its employees and contractors."[20] Underscoring the depth of the organizational problem facing BP, the panel

singled out for criticism BP's overall approach to accident analysis: "BP's investigation system has not instituted effective root cause analysis procedures to identify systemic causal factors."[21]

Prudhoe Bay pipeline leak. In March 2006—one year after the Texas City refinery explosion and one year before the Chemical Safety Board report on it—BP had yet another significant industrial accident. Its network of pipelines in Prudhoe Bay, Alaska, leaked 212,252 gallons of oil into the delicate tundra environment—the worst spill ever recorded on the North Slope.[22] The leak went undetected for as long as five days. [23] Upon analysis, the pipes were found to have been poorly maintained and inspected.[24] BP paid more than $20 million in fines and restitution.[25]

Progress in follow-up on the safety recommendations. The Baker panel report contained 10 recommendations "intended to promote significant, sustained improvements in BP's process safety performance."[26] Recommendation nine advocated that BP establish an independent expert to monitor and report on its progress in executing the panel's other recommendations in its U.S. refineries, in refining management, and at the BP board and executive management levels.[27] In the executive summary of the third annual report of that expert, covering January–December 2009, he remarked that:

> Delivery against milestones related to implementation of the Recommendations remains a critical performance objective for the U.S. refineries. Virtually all of the milestones in the U.S. Refining's 2009 plans were delivered on schedule.
>
> "While significant gaps have been closed and most of the new systems, processes, standards, and practices required for continued process safety improvements have been developed, much work remains to be done to fully implement them. BP must now demonstrate improved capability for systematic management of these systems, processes, standards, and practices so it can accelerate the overall pace of implementing the Recommendations.[28]

The independent expert also noted, apropos of the Baker panel report's final recommendation that BP use the lessons learned from the Texas City tragedy to transform the company into a recognized industry leader in process safety management:

> BP is striving to transform the company into a recognized industry leader in process safety . . . and . . . has made significant improvements each year in response to all Recommendations. However, much work remains to fully implement the Recommendations. . . . BP will be an industry leader when its process safety performance is superior to that of its peers, and its peers recognize BP as a true leader to emulate.[29]

In recent years in the Gulf of Mexico, BP's safety offshore drilling record was reportedly excellent.[30]

Deepwater Horizon

BP's safety culture failed on the night of April 20, 2010, as reflected in the actions of BP personnel on- and offshore and in the actions of BP's contractors. As described in Chapter 4, BP, Halliburton, and Transocean did not adequately identify or address risks of an accident—not in the well design, cementing, or temporary abandonment procedures. Their management systems were marked by poor communications among BP, Transocean, and Halliburton employees regarding the risks associated with decisions being made. The decisionmaking process on the rig was excessively compartmentalized, so individuals on the rig frequently made critical decisions without fully appreciating just how essential the decisions were to well safety—singly and in combination. As a result, officials made a series of decisions that saved BP, Halliburton, and Transocean time and money—but without full appreciation of the associated risks.

BP conducted its own accident investigation of *Deepwater Horizon*, but once again kept its scope extremely narrow.[31] Professor Najmedin Meshkati of the University of Southern California, Los Angles—a member of the separate National Academy of Engineering committee investigating the oil spill—criticized BP's accident report for neglecting to "address human performance issues and organizational factors which, in any major accident investigation, constitute major contributing factors." He added that BP's investigation also ignored factors such as fatigue, long shifts, and the company's poor safety culture.[32]

Upon reading the BP report, this Commission's Chief Scientific and Engineering Advisor, Richard Sears, commented that "it appeared that for BP, the accident happened at 9:49 p.m. on April 20; whereas in some ways, the blowout began in early 2009 when they initially designed the well."[33]

The Culture on the Rig

BP was operator of the Macondo well and in that capacity had both the overall responsibility for everything that went on and was in the best position to promote a culture of safety on the rig, including in the actions of its two significant contractors, Halliburton and Transocean. But the extensive involvement of those contractors in the mistakes that caused the Macondo well blowout underscores the compelling need for a fundamental shift in industry culture that extends beyond BP. As described in Chapter 2, offshore drilling and energy production involve a complex interrelationship among companies. No single company—not even at the major integrated oil companies—performs the full panoply of activities required for oil and gas drilling. All contract out for the services of other companies for critical aspects of their operations. For this same reason, whatever the specific contractual relationships, operating safely in this environment clearly demands a safety culture that encompasses every element of the extended drilling services, and operating industry.

Transocean, for instance, was a major contractor for the Macondo well and is the world's largest operator of offshore oil rigs, including the *Deepwater Horizon*; Transocean personnel made up the largest single contingent on the rig at the time of the accident, and 9 of the 11 men who died on April 20 worked for the company. As described in Chapter 4,

a number of the mistakes made on the rig can be directly traced to Transocean personnel, including inadequate monitoring of the Macondo well for problems during the temporary abandonment procedures and failure to divert the mud and gas away from the rig during the first few minutes of the blowout.

A survey of the Transocean crew regarding "safety management and safety culture" on the *Deepwater Horizon* conducted just a few weeks before the accident hints at the organizational roots of the problem.[34] The research, conducted at Transocean's request, involved surveys and interviews with hundreds of employees onshore and on four rigs, including *Deepwater Horizon*, which was surveyed from March 12 to March 16. The reviewers found *Deepwater Horizon* "relatively strong in many of the core aspects of safety management."[35] But there were also weaknesses. Some 46 percent of crew members surveyed felt that some of the workforce feared reprisals for reporting unsafe situations, and 15 percent felt that there were not always enough people available to carry out work safely.[36] Some Transocean crews complained that the safety manual was "unstructured," "hard to navigate," and "not written with the end user in mind"; and that there is "poor distinction between what is required and how this should be achieved."[37] According to the final survey report, Transocean's crews "don't always know what they don't know. [F]ront line crews are potentially working with a mindset that they believe they are fully aware of all the hazards when it's highly likely that they are not."[38]

Halliburton, BP's other major contractor for the Macondo well, is one of the world's largest providers of products and services to the energy industry.[39] It has offices in 70 countries, and Halliburton-affiliated companies have participated in the majority of producing deepwater wells and contributed to most of the world's deepwater well completions.[40] Yet notwithstanding its clear experience and expertise in cementing—a $1.7 billion business for the company in 2009[41]—Halliburton prepared cement for the Macondo well that had repeatedly failed Halliburton's own laboratory tests (see Chapter 4). And then, despite those test results, Halliburton managers onshore let its crew and those of Transocean and BP on the Deepwater Horizon continue with the cement job apparently without first ensuring good stability results.

Halliburton also was the cementer on a well that suffered a blowout in August 2009, in the Timor Sea off Australia. The *Montara* rig caught fire and a well leaked tens of thousands of barrels of oil over two and a half months before it was shut down.[42] The leak occurred because the cement seal failed, the government report into the accident found. However, the report said it would not be appropriate to criticize Halliburton, because the operator "exercised overall control over and responsibility for cementing operations."[43] The inquiry concluded that "Halliburton was not required or expected to 'value add' by doing more than complying with [the operator's] instructions."[44] In this, *Montara* offers yet another example of a lack of communication between operators and service providers and of the gaps between the silos of expertise that exist in the deepwater oil and gas industry.

Absence of Adequate Safety Culture in the Offshore U.S. Oil and Gas Industry

As noted, the offshore oil and gas industry is inherently risky, beginning with the initial exploratory activities and continuing through the transportation of oil and gas produced

from the wells. The drilling rigs are themselves dangerous places to work, dense with heavy equipment, hazardous chemicals, and flammable oil and gas—all surrounded by the open-sea environment far from shore, where weather and water conditions can change rapidly and dramatically. The seriousness of these risks to worker safety and the environment are underscored by the sheer number of accidents, large and small, that have occurred in oil and gas drilling activities in the Gulf, even in the absence of a major spill since the 1979 Ixtoc spill, until the Macondo blowout (see graphic).[45] No operator or lessee is immune from these safety challenges.

But the pervasive riskiness of exploring for and producing offshore oil and gas does not explain the extent to which approaches to safety differ among companies, nor why they differ within companies depending on where they are working. From 2004 to 2009, fatalities in the offshore oil and gas industry were more than four times higher per person-hours worked in U.S. waters than in European waters, even though many of the same companies work in both venues.[46] This striking statistical discrepancy reinforces the view that the problem is not an inherent trait of the business itself, but rather depends on the differing cultures and regulatory systems under which members of the industry operate.

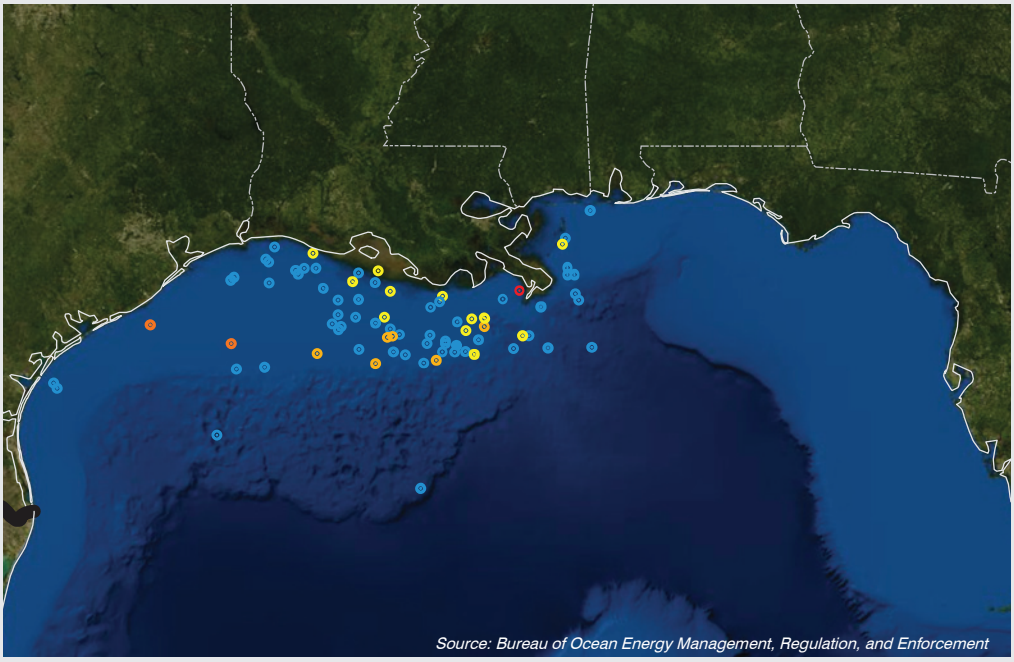
The American Petroleum Institute: expert or advocate? In the United States, the American Petroleum Institute (API) has played a dominant role in developing safety standards for the oil and gas industry.[47] And it clearly possesses significant, longstanding technical expertise. API produces standards, recommended practices, specifications, codes, technical publications, reports, and studies that cover the industry and are utilized around the world.[48] In conjunction with API's Quality Programs, many of these standards form the basis of API certification programs.[49] And the U.S. Department of the Interior has historically adopted those recommended practices and standards, developed by technical experts within API, as formal agency regulations.[50]

Based on this Commission's multiple meetings and discussions with leading members of the oil and gas industry, however, it is clear that API's ability to serve as a reliable standard-setter for drilling safety is compromised by its role as the industry's principal lobbyist and public policy advocate. Because they would make oil and gas industry operations potentially more costly, API regularly resists agency rulemakings that government regulators believe would make those operations safer, and API favors rulemaking that promotes industry autonomy from government oversight.[51]

According to statements made by industry officials to the Commission, API's proffered safety and technical standards were a major casualty of this conflicted role. As described by one representative, API-proposed safety standards have increasingly failed to reflect "best industry practices" and have instead expressed the "lowest common denominator"—in other words, a standard that almost all operators could readily achieve. Because, moreover, the Interior Department has in turn relied on API in developing its own regulatory safety standards, API's shortfalls have undermined the entire federal regulatory system.[52]

As described in Chapter 4, the inadequacies of the resulting federal standards are evident in the decisions that led to the Macondo well blowout. Federal authorities lacked regulations

FIGURE 8.1: Loss of Well Control Accidents



Loss of Well Control Accidents and Resulting Consequences

- Loss of Well Control
- Panel Investigation
- Fire or Explosion
- Fatalities
- Fire or Explosion with Fatalities or Injuries

Between 1996 and 2009, in the U.S. Gulf of Mexico, there were 79 reported loss of well control accidents—when hydrocarbons flowed uncontrolled either underground or at the surface.

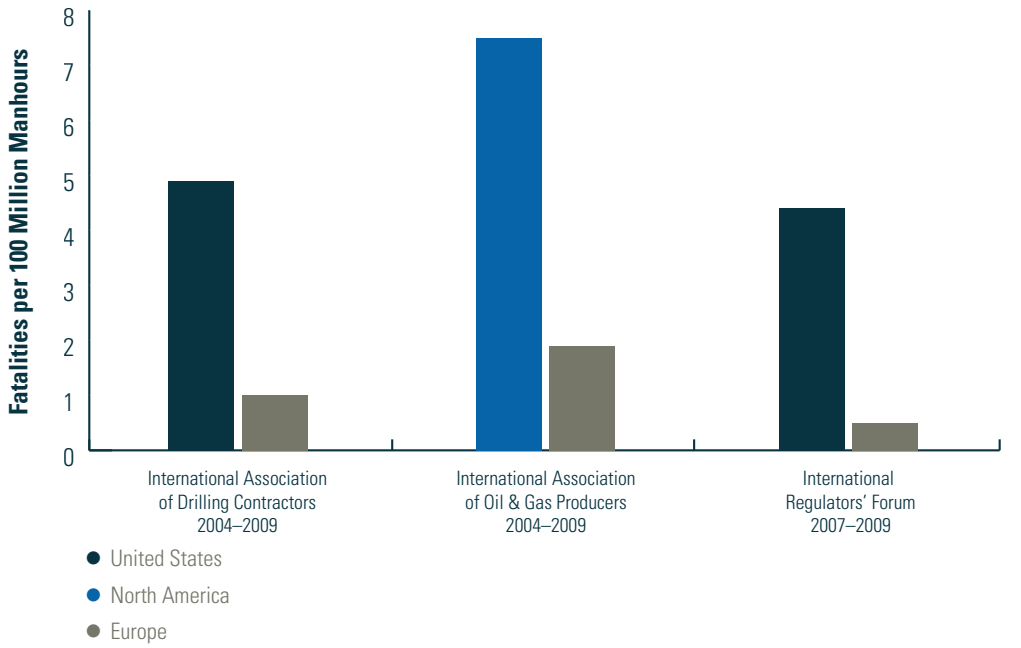
The regulator considers the following three factors when determining whether or not an accident will undergo a panel investigation: the actual and potential severity of the incident; the complexity of the incident; and, the probability of similar incidents occurring.

Loss of Well Control Accidents & Consequences

Date	Company	Consequence Code
01/24/96	Oryx Energy Company	
11/10/96	Norcen Explorer, Inc.	
11/27/96	Tana Oil and Gas Corporation	
12/03/96	Amoco Production Company	
01/10/97	BHP Petroleum, Inc.	
03/04/97	Shell Offshore, Inc.	
04/01/97	American Exploration Company	
05/31/97	Houston Exploration Company	
10/20/97	Freeport-McMoRan Resource Partners	
01/06/98	Hall-Houston Oil Company	
01/16/98	Chevron U.S.A., Inc.	
04/30/98	Vastar Resources Inc.	
07/08/98	Newfield Exploration Company	
11/22/98	Ocean Energy Inc.	
12/09/98	Petrobras America Inc.	
02/10/99	Union Pacific Resources Company	

08/11/99	Freeport McMoran Sulphur Inc.	
09/09/99	Newfield Exploration Company	
12/02/99	Apache Corporation	
12/05/99	Freeport McMoran Sulphur LLC	
01/02/00	Callon Petroleum Operating Company	
01/05/00	Apache Corporation	
01/12/00	Murphy Exploration & Production Company	
02/28/00	Murphy Exploration and Production Company	
03/22/00	Forcenergy Inc.	
04/07/00	Union Oil Company of California	
08/15/00	Houston Exploration Company	
11/18/00	Houston Exploration Company	
03/01/01	Forest Oil Corporation	
04/02/01	Newfield Exploration Company	
04/04/01	Matrix Oil & Gas, Inc.	
05/10/01	Devon Energy Production Company	
05/24/01	BHP Petroleum (Americas) Inc.	
07/06/01	Tri-Union Development Corporation	
07/13/01	William G. Helis Company	
10/24/01	Argo, L.L.C.	
11/21/01	BP Amoco Corporation	
01/12/02	BP Amoco Corporation	
08/08/02	BP Exploration & Oil Inc	
09/07/02	El Paso Production Oil & Gas Company	
10/03/02	Murphy Exploration & Production Co.	
11/14/02	BP Exploration & Production Inc.	
12/06/02	Kerr McGee Corporation	
03/08/03	Anadarko E&P Company	
04/12/03	Helis Oil & Gas Corporation	
04/22/03	ChevronTexaco Corporation	
09/02/03	Manti Operating Company	
12/04/03	Walter Oil & Gas Corporation	
02/09/04	Energy Partners, Ltd.	
02/17/04	Orca Energy (Dunhill), L.P.	
02/22/04	ATP Oil & Gas Corporation	
10/21/04	Amerada Hess Corporation	
03/08/05	Hunt Oil Company	
05/28/05	W & T Offshore, Inc.	
11/30/05	W & T Offshore, Inc.	
12/01/05	Chevron USA.	
02/20/06	Forest Oil Corporation	
11/18/06	Dominion Exploration & Production, Inc.	
01/23/07	Fairways Offshore Exploration, Inc.	
03/16/07	East Cameron Partners, LP	
06/24/07	Stone Energy Corporation	
08/22/07	Apache Corporation	
09/07/07	Eni US Operating Co. Inc.	
11/20/07	BP Corporation North America Inc.	
12/03/07	Rooster Petroleum, LLC	
02/14/08	Apache Corporation	
04/23/08	Apache Corporation	
04/26/08	LLOG Exploration Offshore, Inc.	
05/06/08	Mariner Energy, Inc.	
08/19/08	Energy Resource Technology GOM, Inc.	
10/31/08	Chevron U.S.A. Inc.	
11/01/08	Union Oil Company of California	
12/20/08	El Paso E&P Company, L.P.	
04/19/09	LLOG Exploration Offshore, Inc.	
04/23/09	Stone Energy Corporation	
05/27/09	Stone Energy Corporation	
08/26/09	Stone Energy Corporation	
12/22/09	Not Listed	
12/29/09	Murphy Exploration & Production Company	

FIGURE 8.2: Fatalities from Offshore Oil and Gas Operations



Note: Europe for the International Regulators' Forum Data Represents the United Kingdom, Norway, and the Netherlands
Source: IADC Incident Statistics Program, International Association of Drilling Contractors, http://www.iadc.org/asp.htm;
Safety Performance Indicators, International Association of Oil & Gas Producers, http://www.ogp.org.uk/;
IRF Country Performance Measures, International Regulators' Forum,
http://www.irfoffshoresafety.com/country/performance/.

covering some of the most critical decisions made on the *Deepwater Horizon* that affected the safety of the Macondo well. For instance, notwithstanding the enormously important role cementing plays in well construction—especially in the high-pressure conditions often present in deepwater drilling—there were no meaningful regulations governing the requirements for cementing a well and testing the cement used. Nor were there regulations governing negative-pressure testing of the well's integrity—a fundamental check against dangerous hydrocarbon incursions into an underbalanced well. On many of these critical matters, the federal regulations either failed to account for the particular challenges of deepwater drilling or were silent altogether.

For years, API also led the effort to persuade the Minerals Management Service not to adopt a new regulatory approach—the Safety and Environmental Management System (SEMS)—and instead has favored relying on voluntary, recommended safety practices.[53] Safety and environmental management systems are used in similar forms in other parts of the world and many credit them with the better safety records achieved outside U.S. waters (see Chapter 3). Beginning early in the last decade, the trade organization steadfastly resisted MMS's efforts to require all companies to demonstrate that they have a complete safety and environmental management system[54] in addition to meeting more traditional, prescriptive regulations—despite the fact that this is the direction taken in other countries in response to the Piper Alpha rig explosion in the late 1980s.[55] Indeed, many operators in the Gulf were used to this safety-based approach on their rigs in the North Sea and Canada. It was not until this past September—after the Macondo blowout—that

the Department of the Interior was finally able to announce a new, mandatory Safety and Environmental Management System:[56] almost two decades after the approach was adopted in the United Kingdom, where it is called the "safety case."[57] Moreover, API opposed revisions to the incident reporting rule that would have helped better identify safety risks.[58]

Decreasing safety-related research and development. Safely managing industrial hazards for oil and gas drilling requires experience and knowledge: knowing not only which actions to perform at various points on a checklist during a procedure, but also basic knowledge of the interactions of oil, gas, cement, drilling mud, sand, rock, and salt water that enables correct decisions when unexpected events occur. Yet such knowledge and experience within the industry may be decreasing.

The chair of the University of Texas's Department of Petroleum and Geosystems Engineering, Tad Patzek, testified before Congress in 2010 that "the oil and gas industry has eliminated most of its research capabilities, which three decades ago allowed it to rapidly expand deepwater production."[59] "Academic research has been important but small in scale and permanently starved of funding," Patzek continued. "The depletion of industry research capabilities and the starvation of academia that educates the new industry leaders have resulted in a scarcity of experienced personnel that can grasp the complexity of offshore operations and make quick and correct decisions."[60] Nor, Patzek stressed, could industry depend upon contractors to fill the safety gap: "The individual contractors have different cultures and management structures, leading easily to conflicts of interest, confusion, lack of coordination, and severely slowed decision-making."[61*]

Hazardous Industries Can Become Safer

Even inherently risky businesses can be made much safer, given the right motivations and systems-safety management practices. Civil aviation and nuclear-fueled electric power are two good examples of industries that have had to manage the risk of catastrophic failures and losses. In the public sector, the United States Navy also faced the challenge of improving safety in its nuclear-power vessels—and did so.

The primary motivation for improving safety in each instance is that neither the public (as consumers and as voters) nor the government would allow such enterprises to operate if they suffered many accidents. People would not board planes if an unacceptable number crashed. The reaction to the contained partial core meltdown at the Three Mile Island power plant in 1979 has kept the industry from expanding in the United States for more than three decades.[62] And, nuclear submarines carry highly skilled crews and are enormously expensive to build (not to mention carrying a fuel source that would pose wide dangers in case of a leak)—all factors that compel the Navy to put a premium on safe practices.

* According to Michael Bromwich, Director of the Interior Department's Bureau of Ocean Energy Management, Regulation and Enforcement, the chairs of university departments of petroleum engineering whom he recently visited "expressed great concern about the level of R&D in the private sector into drilling and drilling safety."

Civil aviation. The airline industry, for instance, is well aware that the industry as a whole suffers if the public lacks trust in the safety of any one company. The Federal Aviation Administration (FAA) is responsible for the safety of civil aviation,[63] and the airline industry lends resources to bolster government oversight.[64] The government enhances its oversight abilities by relying heavily on private Designated Engineering Representatives—either consultants or employees of aircraft manufacturers such as Boeing.[65] These engineers work for their employers and may approve, or recommend approval of, technical data provided to the FAA for the company.[66] It is a good example of industry and government "sharing" experts.[67]

Boeing itself has worked closely with the FAA to improve safety performance.[68] In the 1950s, only 20 percent of Americans were willing to fly, and there were 14 to 15 major accidents a year.[69] Boeing had a strong incentive to improve performance, and attitudes toward aviation, if it were to grow its commercial business. Despite an enormous increase (ten- to twentyfold) in airline flight operations between 1955 and 1991, the number of accidents fell to approximately four to five per year, one-fourth the annual rate in the 1950s.[70]

The nuclear Navy. Turning from the skies to the sea, between 1915 and 1963, the U.S. Navy lost about one submarine every three years to noncombat causes.[71] In 1963, when the nuclear-powered *USS Thresher* was lost during a deep test dive, 112 naval personnel and 17 civilians perished.[72] The Navy investigation found that a deficient silver-braze joint in a piping system had failed, flooding the engine room.[73] The investigation went far beyond immediate causes and "found deficient specifications, shipbuilding practices, and maintenance practices, along with inadequate documentation of construction and maintenance actions and deficient operational procedures."[74] After the *Thresher* loss, Admiral Hyman Rickover, then head of the nuclear Navy, told his staff to establish a system to ensure that such an accident would never recur.[75] The new SUBSAFE system was established within 54 days of the loss of the *Thresher*, and no SUBSAFE-certified submarine has since been lost.[76]

SUBSAFE has two goals, both crucial for submarines: maintaining the watertight integrity of the hull, and maintaining operability and integrity of critical systems that allow control and recovery from a flooding hazard.[77] The system covers the administrative, organizational, technical, design, material-control, fabrication, testing, work-control, auditing, and certification aspects of submarine development and operations (see sidebar).[78] As important as procedures, SUBSAFE establishes a mindset—in this case, a questioning attitude and what the officers call *chronic uneasiness*, summarized in the saying, "Trust, but verify."[79]

Another critical component of SUBSAFE is a separation of powers—no simple achievement in an organization as homogeneous and hierarchical as the Navy. In fact, there is always a dynamic tension among the Platform Program Managers (responsible for the costs, schedule, and quality of ships under their control), the Independent Technical Authority, and the Independent Safety and Quality Assurance Authority—the nuclear Navy's "three-legged stool."[80] The Platform Managers can select only from a set of acceptable design options, to ensure that safety is not traded off for performance.[81] The Technical Authority

approves these acceptable options.[82] The Safety Authority is responsible for administering SUBSAFE and enforcing compliance.[83]

Principles of the Naval "SUBSAFE" System

- Top management commitment to safety
- Clear and written safety requirements
- Education, not just training
- Regular rewriting of requirements
- Separation of powers and assignment of responsibilities
- Emphasis on rigor, technical compliance, and work discipline
- Documentation capturing what is done and why it is done
- Participatory audit approach, and requirements for objective quality evidence
- Program based on written procedures, not personality-driven
- Continual certification of a facility
- Accountability and accompanying responsibility
- Special efforts to be vigilant against complacency

SUBSAFE involves a great deal of certification (of design, materials, fabrication, and testing), and the overall SUBSAFE certification must be maintained through the life of the vessel.[84] Audits assure compliance, and the audits are treated not so much as exams by outsiders but as constructive learning experiences.[85] Continuous training and education of personnel are emphasized. [86] Many of the civilian contracting companies that service the nuclear Navy also service the offshore oil and gas industry and seem to cope well with the rigorous nature of the SUBSAFE system.[87]

Learning from Accidents: Exxon, Shell, and Bhopal

The Navy learned from the loss of the *USS Thresher* and set up an effective safety system. The American oil and gas industry must learn from the loss of the *Deepwater Horizon* and do the same today.

The *Exxon Valdez* aftermath. Among oil and gas companies, ExxonMobil's wake-up call came in 1989, when its *Exxon Valdez* tanker struck a reef in Prince William Sound, Alaska, and spilled approximately 11 million gallons of crude oil.[88] Until the *Deepwater Horizon* disaster, this was the biggest spill in U.S. waters.[89] The spill covered thousands of miles of pristine waters and coastal areas, killing marine mammals, fish, and seabirds, and damaging the livelihoods of the people who lived and worked in the region.[90] A fatigued and overworked crew, inadequate safety escort vessels, and a single hulled tanker have been cited among the causes of the accident.[91] Exxon spent approximately $2.1 billion in clean-up costs, and, pursuant to a settlement with the United States and Alaska, agreed to pay a criminal fine of $150 million ($125 million of which was forgiven in light of its cleanup efforts), $100 million in criminal restitution, and $900 million to settle civil claims, subject to a reopener provisions allowing for an additional $100 million.[92*]

* A private civil lawsuit has been under way for the past two decades. A jury initially awarded the plaintiffs $287 million in actual damages and $5 billion in punitive damages, but the Supreme Court subsequently ruled that punitive damages could not exceed twice actual damages, or $507.5 million. Exxon Shipping Co. v. Baker, 554 U.S. 471 (2008).

***Exxon Valdez* Oil Spill**

The crippled tanker *Exxon Valdez* lies atop Bligh Reef off the coast of Alaska two days after running aground on March 24, 1989. More than a quarter-million barrels of oil leaked into Prince William Sound, wreaking environmental havoc and becoming the largest spill in U.S. waters until the *Deepwater Horizon* disaster.

Natalie B. Fobes/National Geographic/Getty Images

Following the spill, both government policy and industry practice changed dramatically. Congress enacted the Oil Pollution Act of 1990 and Exxon introduced its Operations Integrity Management System (OIMS) in 1992.[93] ExxonMobil CEO Rex Tillerson told the Commission's November 9 hearing that "OIMS is a rigorous 11-point set of elements designed to identify management and hazard risks. Its framework covers all aspects of safety, including management leadership and accountability; design, construction and maintenance of facilities; emergency preparedness; management of change; assessment of performance; and, of course, thorough inquiries into accidents and incidents."[94]

"OIMS guides the activities of each of ExxonMobil's more than 80,000 employees," he continued, "as well as our third-party contractors around the world. Over time it has become embedded into everyday work processes at all levels. Through OIMS, ExxonMobil monitors, benchmarks, and measures aspects of our safety performance. Its structure and standards are shared and communicated the world over."[95] "Safety is not proprietary," Tillerson added. "And for this reason ExxonMobil shares its best practices within our industry and across other industries. We seek to learn from others."[96] The reported improvements in the company's safety and environmental performance have been impressive. In 2009, the company reported that it had received a rating of 10 out of 10 from GovernanceMetrics International, placing it among the top one percent of companies

rated.[97]* It also reported that it had had no spills from a marine vessel between 2006 and 2009, and that in 2009 it continued to lead the industry with combined employee and contractor workforce lost-time incident rates at best-ever levels.[98]

Shell's safety response. Shell, a long-time leader in Gulf of Mexico operations (before BP surpassed it, as described in Chapter 2), has had its own safety problems. Two men died in a gas leak on the company's Brent Bravo platform in 2003; former Shell senior manager Bill Campbell, who had earlier led a safety review, said after the accident that his 1999 warnings had been ignored by the company.[99] Shell denied that it operated at high levels of risk.[100]

Shell subsequently tightened and simplified its safety rules.[101] Shell also has promoted the use of the "safety case" worldwide (a risk-management approach to regulation described in Chapter 3).[102] It has adopted the safety-case approach even in the United States, where it is not required to do so, and has promoted it for the industry more broadly.[103] Marvin Odum, president of Shell Oil Company and director of Shell's Upstream Americas business, told the Commission's November 9 hearing that "the safety case in deepwater drilling shows how we identify and assess the hazards on a rig; how we establish the barriers to prevent and control those hazards; how we assign the critical activities needed to maintain the integrity of these barriers."[104]

Odum said that Shell also encourages workers to call for work to stop when they suspect that something is proceeding improperly, and gives awards to these "Goal Zero Heroes" (referring to the corporate goal of zero accidents).[105] He added that audits are key to system safety and that "in 2009, DuPont administered its safety and culture survey in our drilling organization, comparing us to the world's best across a range of industries. While we ranked world-class overall, improvement areas were identified."[106]

Bhopal and Responsible Care. The chemical industry's Responsible Care initiative was developed in Canada and launched in 1985 after the disastrous 1984 chemical leak in Bhopal, India.[107] It operates in 53 countries and describes itself as "the chemical industry's global voluntary initiative under which companies, through their national associations, work together to continuously improve their health, safety and environmental performance, and communicate with stakeholders about their products and processes in the manufacture and supply of safe and affordable goods that bring real benefits to society."[108] The American Chemistry Council can expel member firms for non-compliance with Responsible Care.[109] Subsequent analysis, however, suggests that the program's success has turned less on the availability of such formal sanctions and more on informal disciplinary mechanisms such as peer pressure and institutional norms of compliance: "Executives from leading firms pressure their non-compliant counterparts at industry meetings to adopt and adhere to the industrial codes."[110]

Of course, in drawing lessons from prior accidents, it is essential that they be projected beyond the particular circumstances of the accident at hand, to guide present and future

* Governance Metrics International (GMI) is an independent governance research and ratings firm providing institutional investors an objective way of assessing corporate governance risk as well as governance leaders in their portfolios.

performance, lest government regulators and industry leaders make the classic mistake of "preparing to fight the last war." As discussed in Chapters 3 and 5, despite the steps taken in the aftermath of *Exxon Valdez* to enhance transportation safety and oil spill response from a tanker spill, too little effort was made to take those lessons and apply them more broadly to the risks associated with the future of offshore drilling, in the deepwater of the Gulf.

Industry Self-Policing as a Supplement to Government Regulation

One of the key responsibilities of government is to regulate—to direct the behavior of individuals and institutions according to rules. Many businesses and business groups are involved in internal standard-setting, evaluation, and other activities that constitute self-policing or self-regulation. Such oversight can be conducted by a private entity established and supported by an industry to ensure safe operations by individual members (among other purposes), often because industry leaders recognize that a misstep by any one member necessarily has significant repercussions for them all. But even in industries with strong self-policing, government also needs to be strongly present, providing oversight and/or additional regulatory control—responsibilities that cannot be abdicated if public safety, health, and welfare are to be protected.

The logic of self-policing. Industry-standard setting and self-policing organizations are widespread in the United States and in most industrialized nations—typically for operations marked by technical complexity, such as the chemical, nuclear power, civil aviation, and oil and gas industries, where government oversight is also present. These processes coexist where there are, as a practical matter, relatively limited numbers of people with the requisite expertise and experience, making it hard for government to be able to rely solely on its own personnel (especially when government cannot compete with private-sector salaries for those experts). Support for standard-setting and self-policing also arises in industries whose reputations depend on the performance of each company, and where significant revenues are at stake—witness both the airline industry's private Designated Engineering Representatives (discussed above) and the Institute of Nuclear Power Operations (see below). Though the Navy is a government organization, SUBSAFE is also an example of self-policing to help assure the safety of its nuclear submarines.

The limits of unregulated self-policing. Industry self-policing is not a substitute for government but serves as an important supplement to government oversight. And the cost of forgetting that essential premise can be calamitous. In the financial sector, for example, the Securities and Exchange Commission's Consolidated Supervised Entities Program had, in 2004, delegated regulatory risk assessment of global investment bank conglomerates to the banks themselves.[111] The program was designed to cover a regulatory gap left by Congress amid changes in global finance, but it was entirely voluntary.[112] Four years later, Securities and Exchange Commission Chairman Christopher Cox ended the program, declaring it a failure—indeed "fundamentally flawed"—after companies like Bear Sterns failed to adequately assess the risk of a sharp downturn in housing prices on their large, leveraged investments in mortgage-backed securities.[113]

A second cautionary tale involves an environmental disaster. When political opposition stymied federal and state regulation of toxic coal ash and other residues from power generation, the electric utilities that had opposed regulations deferred to the Utilities Solid Wastes Activities Group's voluntary "Action Plan" to manage such wastes.[114] The U.S. Environmental Protection Agency stepped back from regulating such hazards.[115] And, in 2008, an earthen dam containing coal ash gave way in eastern Tennessee, releasing more than a billion gallons of coal ash across a large portion of Roane County and polluting rivers that carried the hazardous wastes farther afield.[116]

The Nuclear Model

The risk-management challenges presented by nuclear power are in some respects analogous to those presented by deepwater drilling: the dependence on highly sophisticated and complex technologies, the low probability/catastrophic consequences nature of the risks generated, and the related tendency for a culture of complacency to develop over time in the absence of major accidents. For the nuclear power industry, it took a crisis—the partial meltdown in 1979 of the radioactive core in Unit Two at the Three Mile Island Nuclear Generating Station—to prompt a transformation of its safety culture.[117] But that is what industry accomplished and reportedly with significant, positive results.[118] For that reason, the nuclear power industry's method of transforming business-as-usual practices offers a useful analogue as the oil and gas industry now seeks to do the same more than 30 years later.

The first recommendation of the President's Commission that investigated the root causes of the Three Mile Island accident was directed to industry, and made clear the extent to which the industry need to transform its safety culture:

> [T]he nuclear industry must dramatically change its attitudes toward safety and regulations. The Commission has recommended that the new regulatory agency prescribe strict standards. At the same time . . . the industry must also set and police its own standards of excellence to ensure the effective management and safe operation of nuclear power plants.[119]

Two months later, in December 1979, the nuclear power industry created the Institute of Nuclear Power Operations (INPO), a nonprofit organization with the ambitious mission "to promote the highest levels of safety and reliability—to promote excellence—in the operation of commercial nuclear power plants."[120]

INPO's structure more closely resembles the utilities it "regulates" than it does the Nuclear Regulatory Commission (NRC), the federal regulatory agency whose work INPO is designed to complement. INPO's president answers to a board of directors, consisting of senior industry executives—mainly CEOs.[121] A few years after its founding, INPO established its own inspection process, based on its studies of what needed inspecting and how to do so.[122] Today, nuclear power plant inspections are thorough, but not adversarial. Because many INPO inspectors are nuclear employees drawn from other power plants, a great deal of cross-fertilization of knowledge occurs, and strong peer relationships are created.[123] INPO's normative system establishes a structured way of thinking about plant

operations by translating these matters into the language of responsibility as it spells out what it means to occupy a particular role and what it means to behave in a manner appropriate to that position.[124]

Inspection teams and procedures. INPO inspection teams usually number about 20 people: one-third are permanent, full-time inspectors; one-third are on loan from the industry for 18 to 24 months; and the remainder are peer evaluators on loan just for that particular inspection (but these cannot be from the utility being inspected).[125]

Each of the 66 nuclear sites (encompassing 104 reactors, operated by 26 utilities) is inspected every 24 months.[126] Inspectors rotate through assignments; each inspector averages 4 to 5 inspections per year. (Besides the major inspection of each site every two years, INPO performs a series of other evaluations and provides other safety-oriented services throughout the year. For example, utilities' training programs are evaluated and accredited every 24 months.)[127] Importantly, INPO is not the sole source of plant inspections, but instead serves as a significant supplement. Nuclear insurers, the Occupational Safety and Health Administration, and the NRC also conduct inspections; INPO coordinates with the NRC and other inspectors to avoid schedule conflicts.[128]

Nor is there anything casual about an INPO inspection. It is thorough and careful, extending for five to six weeks: two weeks of preparation and analysis of pre-delivered data from the site, two weeks on the site, a week of internal review and report writing by functional and cross-functional sub-teams, and perhaps another week reviewing with the INPO president.[129] Any lessons learned that are deemed valuable to the rest of the industry are posted on INPO's private online portal, but the name of the site is scrubbed from the text.[130] All plants respond to INPO's assessment reports by documenting actions planned to address any reported problems. A poorly performing plant will receive higher attention from INPO to see if the plant's responsive actions are on track. INPO will also work to give them help or coordinate help from other stations.[131] Furthermore, assessment results are never revealed to anyone other than the utility CEOs and site managers, but INPO formally meets with the NRC four times a year to discuss trends and information of "mutual interest." And if INPO has discovered serious problems associated with specific plants, it notifies the NRC.[132]

The performance evaluation. INPO considers at each plant such metrics as consistency of operations, safety-system performance, and workers' collective radiation exposure.[133] But its Plant Performance Assessments are the real backbone of its work. These exercises figuratively deconstruct and reconstruct the plants, looking into all aspects of operations, maintenance, and engineering. The inspection teams evaluate processes and behaviors that cross organizational boundaries such as safety culture, self-assessment, corrective action, operating experience, human performance, and training. The performance of operations and training personnel during simulator exercises is included in each evaluation. Where possible, observations of plant startups, shutdowns, and major planned changes are also included.[134]

INPO strongly discourages a rule-bound, compliance-oriented approach that would encourage a mentality of ticking boxes—and in fact its reports are not in checklist form.[135] Many of the risk factors that nuclear companies must deal with are beyond their control. One issue that is clearly within the industry's control is standardization: of design requirements, resulting advanced designs, and operations. The industry has devoted significant time and resources to this issue over the past few decades.[136] "Good practice" documents are written with an eye toward processes that are applicable across the industry.[137]

From the control room to the CEO. INPO directly connects those responsible for the day-to-day operations of nuclear plants with senior management.[138] Two INPO Industry Review Groups, which act in an advisory capacity to senior management, enable lower-level employees involved in plant operations to communicate with vice presidents and division directors.[139] Review groups also assess INPO programs and evaluate INPO's performance itself.[140] The existence of these groups reflects INPO's commitment to tie together senior management and lower-level, operational employees.

INPO's influence. In addition to its individual site evaluations, INPO hosts an industry "CEO Conference," usually each November, which includes numerous speakers from nuclear organizations and also some non-nuclear companies, with a focus on nuclear safety.[141] During this conference, the INPO president gathers only the 26 utility CEOs in a private room to reveal to all the executives the grades for each site, based on the assessments.[142] These grades range from one (most favorable) to five. Approximately 40 percent of the grades are INPO 1, 40 to 50 percent are INPO 2, and 10 to 15 percent are INPO 3 or 4. (The last time any site was given a grade of 5 was in the late 1980s.)[143] An INPO 5 indicates a site with significant operational problems, triggering a shutdown. And a grade of INPO 4 requires a verbal explanation by the affected CEO on the spot.[144] This meeting is not intended to shame or punish, but to put the facts on the table. CEOs with low-rated plants typically will describe to their peers what comprehensive actions they are undertaking to address the causes of the problems. All CEOs recognize that it is in everybody's interest to help lower performers operate better. At the larger dinner, with all conference attendees present, INPO announces and congratulates only the INPO 1 plants.[145] A former Chief Nuclear Officer of a major utility described INPO 1 as equivalent to receiving an Academy Award.[146]

Presentation of relative standings before the rest of the industry produces a high level of peer pressure; as one CEO put it, "You get the whole top level of the utility industry focused on the poor performer."[147] It also gives the industry the ability to "clean out" poor management. Because INPO's directors are industry peers, CEOs may become aware of a company taking too much risk and offer to loan people to help the "underperformer" come up to speed.[148]

The impact on insurance premiums. Although the Price-Anderson Act limits the liability of those who operate nuclear power plants in the case of an accident, owners of nuclear plants insure through Nuclear Electric Insurance Limited, an industry mutual insurance company, against losses associated with on-site problems such as power interruptions,

decontamination, and physical property damage.[149] Nuclear Electric Insurance Limited is allowed to visit INPO's office at least once a year to view the assessment ratings (but they are not provided with copies).[150] And, like any other insurance company, Nuclear Electric Insurance Limited sets insurance premiums based on its assessment of risk. Sites with top INPO ratings are charged lower premiums than stations with lower ratings.[151] NEIL requires that license holders be active members of INPO or that they notify NEIL formally and promptly if they stop being a member – and they must show NEIL how they will accomplish a level of oversight equivalent to what INPO provides. This has never occurred. In reality, NEIL's board would quickly discuss removal of insurance coverage should a member choose to drop out of INPO activities.[152] So utilities have a tremendous financial incentive to carry out INPO's recommendations.[153]

Compensation competitive with industry. INPO has about 400 employees, including about 60 on long-term loan from its member utilities. Of the total staff and management cadre, 250 are nuclear technical personnel.[154] INPO can do its job only if its employees possess technical expertise at least equal to that possessed by those in the industry INPO is charged with overseeing. To a certain extent, INPO achieves that standard by relying on experts on loan from industry for extended periods of time.[155] But to ensure that INPO's own full-time personnel possess the requisite qualifications, industry salaries are benchmarked, and INPO provides its employees comparable compensation.[156] INPO has therefore not suffered from the expertise gap too often evident with government inspectors (witness the issue raised at the founding of the Minerals Management Service, as discussed in Chapter 3). INPO can pay these higher salaries because it is not subject to the same budgetary constraints faced by a public agency. Each utility contributes to INPO's budget based on the number of reactors it owns. Budgets are approved by INPO's board each autumn. (INPO's fiscal year 2010 budget was $99 million, with more than $100 million budgeted for 2011.)[157]

INPO "clout" and industry acceptance. INPO's ability to achieve widespread acceptance within the nuclear power industry was not preordained. The new self-policing enterprise had to earn the necessary reputation for fairness and integrity over time.[158] A formative moment in gaining the necessary stature occurred in 1988, when INPO helped bring about the firing of a utility's corporate leadership following a plant shutdown.[159] Beginning in December 1984, INPO inspectors reported pervasive safety problems at Philadelphia Electric's Peach Bottom nuclear plant—including incidents of employees literally sleeping on the job. When INPO was dissatisfied with the plant's response to these concerns, it scheduled more inspections and meetings with Philadelphia Electric officials, and sent letters further detailing the depth of its concerns. These concerns prompted the NRC to order a shutdown of the plant, and when Philadelphia Electric submitted a recovery plan to the Commission to restart the plant, an INPO-convened industry panel sharply condemned the plan as seriously flawed. INPO and the NRC worked closely and cooperatively, with INPO so harshly criticizing Philadelphia Electric's management that several top executives ultimately lost their jobs. From then on, the message within the industry was clear: "INPO has a great deal of clout" and Peach Bottom became a symbol of INPO's new power. [160]

Although INPO has its detractors,* it does appear to have helped the nuclear power industry improve and maintain performance and safety during the past three decades. INPO has helped the industry measure its progress in improving safety standards and has served as a vehicle for making advances in control-room design, plant and personnel performance, training and qualification, self-regulation, emergency response, maintenance, and radiation protection, among other areas.[161] During the past 30 years, the nuclear industry has improved plant efficiency, significantly reduced the number of automatic emergency reactor shutdowns per year, and reduced collective radiation accident rates by a factor of six compared to the 1980s.[162] The industry has achieved these milestones, in part, through INPO's role in promoting a strong nuclear safety culture and presenting performance objectives and criteria to help the industry strive for and surpass safety goals.[163]

An INPO for Oil?

In the aftermath of the *Deepwater Horizon* spill, could the oil and gas industry similarly improve its safety culture by creating a self-policing entity like INPO as a supplement to government oversight? There are clear parallels that would strongly support such an effort, but also some equally clear differences between the oil and gas industry and the nuclear power industry that at least caution against wholesale adoption of the INPO model.

Similarities: Need, incentive, and means. The reason the INPO model holds promise is because the oil and gas industry, like the nuclear power industry after Three Mile Island, has both the substantial economic resources and the necessary economic incentive to make it happen. INPO was formed because doing so was in industry's self-interest.[164] As the *Deepwater Horizon* disaster made unambiguously clear, the entire industry's reputation, and perhaps its viability, ultimately turn on its lowest-performing members.† If any one company is involved in an accident with widespread and potentially enormous costs, like those that followed the Macondo blowout, everyone in the industry—companies and employees—suffers, as do regional economies and the nation as a whole. No one, in industry or in government, can afford a repeat of the Macondo explosion and spill. Also, as the enormous sums that BP was willing and able to expend to contain and respond to the Gulf spill make clear (see Chapter 5), the oil and gas industry possesses the financial means to fund a very healthy and effective self-policing organization akin to INPO.

A second fundamental parallel is that no one in the oil and gas industry has the unilateral right to engage in offshore drilling on the outer continental shelf any more than a utility has the right to construct and operate a nuclear power plant absent federal governmental approval. Indeed, the extent of governmental authority is even greater in the offshore context. The oil and gas industry does not own the valuable energy resources located on the outer continental shelf, which belong to the American people and are managed by the federal government on their behalf. As described in Chapter 3, the government accordingly

* The Union of Concerned Scientists has on occasion faulted INPO (and the Nuclear Regulatory Commission) for not inspecting some plants with sufficient rigor and skepticism, and has pointedly raised the issue whether the fact that industry pays for INPO's services presents a conflict of interest that compromises its essential impartiality.

† This was also the case in the INPO context; in part, industry mobilized to unify "in reaction to a mutual internal threat, unsafe nuclear utilities." Joseph Rees, *Hostages of Each Other* (Chicago: The University of Chicago Press 1994), 44.

possesses sweeping authority to dictate the terms of private access to those resources in its lease agreements with private parties. And, in particular, government could decide to condition such access, either directly or indirectly, on participation with an industry safety institute.

A third clear parallel is the possibility in both contexts—offshore drilling and nuclear power—for industry self-policing to supplement government regulation.[165] As described in Chapter 3, government regulators need to improve their in-house technical expertise dramatically,[166] but they are unlikely ever to possess technical expertise truly commensurate with that of private industry. The salary differential, combined with the sheer depth of industry expertise on a wide variety of topics critical to understanding and managing offshore drilling operations, would make that goal illusory. Such expertise is, however, a prerequisite for the thorough, rigorous inspections required to ensure safe operation of dozens of deepwater exploration rigs and production platforms (the former operating in multiple locations and different geologies each year)[167]—a number that rises sharply if installations in shallower Gulf waters are included. By supplementing governmental oversight, with the kind of self-policing accomplished by INPO for nuclear power, that gap in expertise can be sharply narrowed. Government can never abdicate its ultimate responsibility to ensure drilling safety, but it can effectively take advantage of industry expertise to meet that objective.

Differences that warrant modifying the INPO model. But there are also clear differences between the two industries that would require a differently defined self-policing entity for offshore oil and gas. For instance, the U.S. nuclear power industry is based at a limited number of fixed sites, using a small number of known technological designs, and operated by an industry subject to comprehensive public regulation[168]—from permission to construct facilities through detailed oversight of design, operations, and maintenance. The oil and gas industry is structured much differently. As described by ExxonMobil's Tillerson, his industry "is moving to different locations, different environments, evolving, all kinds of technologies being introduced."[169] For this reason, he explained, while the oil and gas industry can "look at the principles around INPO in terms of how do you share best practices, how do you assess where the companies are operating at certain levels of competency?"[170], he appeared to suggest there would be limits in the application of every aspect of the INPO model to offshore drilling for oil and gas.

The oil and gas industry is more fragmented and diversified in nature—from integrated global oil companies to independent exploration and drilling enterprises—and therefore less cohesive than the nuclear power operators who joined to establish INPO.* As a result, it could be more challenging to create an INPO-like organization. And oil and gas executives would need assurances that any industry-wide efforts to promote better safety did not subsequently serve as the basis for claims that industry had violated antitrust laws. Finally, concerns about potential disclosure to business competitors of proprietary information might make it harder to establish an INPO-like entity in the oil and gas

* Prior to the Three Mile Island accident, however, the nuclear power industry was reportedly far less cohesive than it became after that accident. See Rees, *Hostages of Each Other*, 42 ("when officials describe the pre-TMI nuclear industry, a collective portrait emerges in which each nuclear utility behaved like an 'island unto itself' or 'independent barony.' In short, the industry was *fragmented.*") (emphasis in original).

industry. Technology and design apparently are more uniform in nuclear power than in offshore drilling. For this reason, Michael Bromwich, Director of the Bureau of Ocean Energy Management, Regulation, and Enforcement (the successor to MMS), cautioned that an INPO-like approach might run into problems if companies perceived the potential for inspections of offshore facilities to reveal "technical and proprietary and confidential information that companies may be reluctant to share with one another."[171]

Essential Features of a Self-Policing Safety Organization for the Oil and Gas Industry

Like the nuclear power industry in 1979—in the immediate aftermath of the Three Mile Island accident—the nation's oil and gas industry needs now to embrace the potential for an industry safety institute to supplement government oversight of industry operations. Akin to INPO, such a new safety institute can provide the nation with the assurances of safety necessary to allow the oil and gas industry access to the nation's energy resources on the outer continental shelf. To be sure, the significant differences between the two types of industries warrant significant differences in the precise structure and operation of their respective industry safety institutes. But, as elaborated below, the basic, successful principles upon which the INPO model is premised can serve as the touchstones for the oil and gas industry in establishing its own.

Credibility. To be credible, any industry-created safety institute would need to have complete command of technical expertise available through industry sources—and complete freedom from any suggestion that its operations are compromised by multiple other interests and agendas. As a consensus-based organization, the American Petroleum Institute (API) is culturally ill-suited to drive a safety revolution in the industry. For this reason, it is essential that the safety enterprise operate apart from the API. As described above and in Chapter 3, API's longstanding role as an industry lobbyist and policy advocate—with an established record of opposing reform and modernization of safety regulations—renders it inappropriate to serve a self-policing function. In the aftermath of the *Deepwater Horizon* tragedy, the Commission strongly believes that the oil and gas industry cannot persuade the American public that it is changing business-as-usual practices if it attempts to fend off more effective public oversight by chartering a self-policing function under the control of an advocacy organization.

An industry-wide commitment to rigorous auditing and continuous improvement. The INPO experience makes clear that any successful oil and gas industry safety institute would require in the first instance strong board-level support from CEOs and boards of directors of member companies for a rigorous inspection and auditing function. Such audits would need to be aimed at assessing companies' safety cultures (from design, training, and operations through incident investigation and management of improvements) and encouraging learning about and implementation of enhanced practices. As at INPO, the inspection and auditing function would need to be conducted by safety institute staff, complemented by experts seconded from industry companies, able to analyze the full range of technologies and practices, and designed to promote cross-company learning and shared responsibility while protecting proprietary information.

There would also need to be a commitment to share findings about safety records and best practices within the industry, aggregate data, and analyze performance trends, shortcomings, and needs for further research and development. Accountability could be enhanced by a requirement that companies report their audit scores to their boards of directors and insurance companies.

The main goal is to drive continuous improvement in every company's standards and performance, measured against global benchmarks. The means, to that end, include the safety auditor's reviews; insurer evaluations of risk; and management recognition of and incentives for effective behavior. Senior leadership would be accountable to the company's board of directors, who in turn would be accountable to investors.

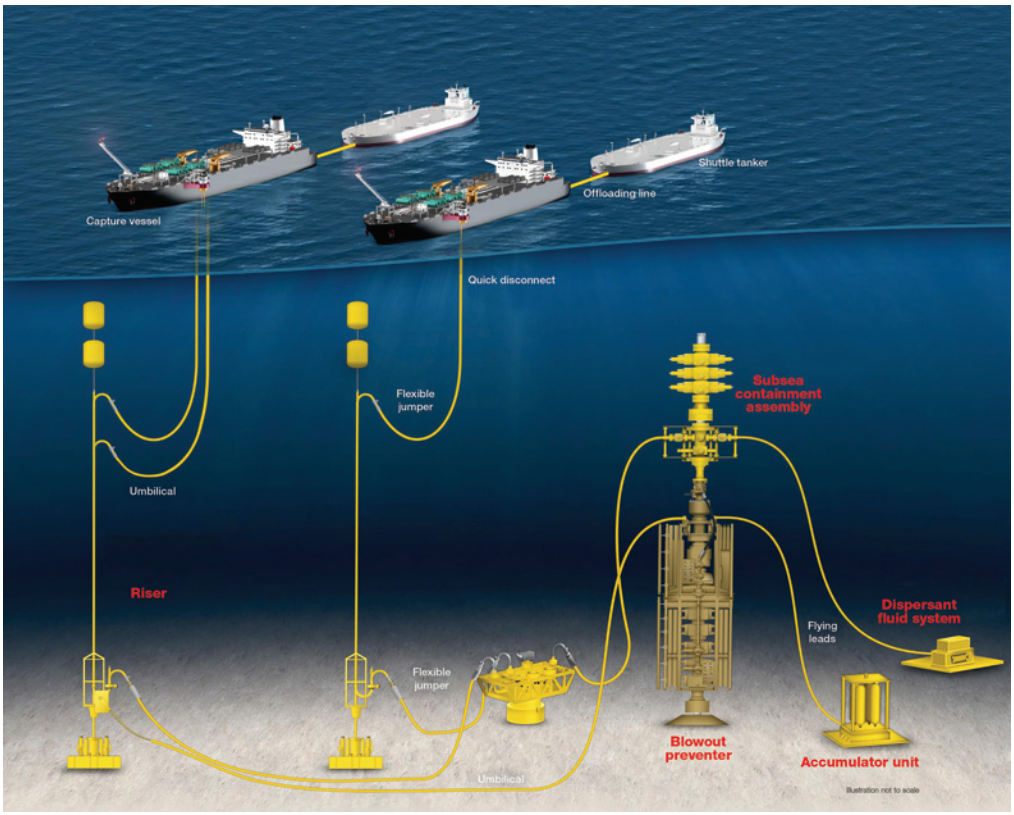
In a broader sense, the industry's safety institute could facilitate a smooth transition to a regulatory regime based on systems safety engineering and improved coordination among operators and contractors—the principles of the U.K.'s "safety case" that shifts responsibility for maintaining safe operations at all times to the operators themselves. It should drive continuous improvement in standards and practices by incorporating the highest standards achieved globally, including (but not exclusively) those set by the API.

An initial set of standards and scope of operation. The industry needs to benchmark safety and environmental practice rules against recognized global best practices. The Safety and Environmental Management Program Recommended Practice 75 (API RP 75) developed in 1993 by the API and incorporated by reference in the Department of the Interior's new workplace safety rules, adopted in October 2010, is a reasonable starting point.[172] Updates to those safety rules are needed immediately, but a new industry safety institution could make a credible start by requiring members to adopt all safety standards promptly—and mandating that the companies, in turn, require that their contractors and service providers comply with the new safety rules.

Because the number of offshore drilling operations subject to potential inspection is much greater than the number of nuclear sites INPO must review (although the number of exploratory rigs on the outer continental shelf is comparable to the number of nuclear plant sites), any new oil and gas industry safety institution will likely need, as a practical matter, to phase in its inspections over time. Accordingly, the safety institute will need to identify those operations that present the greatest risks because of the type of drilling (for example, deepwater or ultra-deepwater), the challenges of drilling in a particular kind of or less-well-known geologic formation, or the location of the operation in a remote frontier area where containment and response resources may be fewer.* Over time, the safety institute might move to cover more offshore operations to reduce the risk of accidents that can lead to loss of life or property, or environmental damage.

* Given the speed with which companies are moving into ever deeper, less well understood geologic formations, the institute will have to move quickly.

FIGURE 8.3: Schematic of the Marine Well Containment System



Courtesy of the Marine Well Containment Company LLC

Industry Responsibilities for Containment and Response

Industry's responsibilities do not end with efforts to prevent blowouts like that at the Macondo well. They extend to efforts to contain any such incidents as quickly as possible and to mitigate the harm caused by spills through effective response efforts. As described in Chapter 5, once a spill occurs, the government must be capable of taking charge of those efforts. But government depends upon the resources and expertise of private industry to contain a blown-out well and to respond to a massive subsea oil spill. Chapter 5 also explains how woefully unprepared both government and industry were to contain or respond to a deepwater well blowout like that at Macondo. All parties lacked adequate contingency planning, and neither government nor industry had invested sufficiently in research, development, and demonstration to improve containment or response technology. Notwithstanding its promises in the aftermath of *Exxon Valdez* that industry would commit significant funds to support more research and development in response technology—through the "Marine Spill Response Corporation," for example—those commitments were soon forgotten as memories dimmed.[173]

From now on, the oil and gas industry needs to combine its commitment to transform its safety culture with adequate resources for containment and response. Large-scale rescue, response, and containment capabilities need to be developed and demonstrated—including

equipment, procedures, and logistics—and enabled by extensive training, including full-scale field exercises and international cooperation.

To that end, at least two industry spill containment initiatives have emerged that build on ideas and equipment that were deployed in response to the Macondo blowout and spill. The nonprofit Marine Well Containment Company, created in July 2010 by four of the five major, integrated oil and gas companies (with BP subsequently announcing its intention to join), is a significant step toward improving well containment capability in the Gulf of Mexico.[174] The four founding companies have committed $1 billion for startup costs to develop the Marine Well Containment Company's rapid-response system, which includes modular containment equipment that can be used to collect oil flowing from a blown-out deepwater well. The system is designed to mobilize within 24 hours and be operational within weeks, ready to contain spills 10,000 feet below the surface, at volumes up to 100,000 barrels per day.[175] Although many of the details surrounding the company's governance and membership structure have not yet been finalized, membership is open to all oil and gas operators in the Gulf of Mexico. Nonmembers will be able to gain access through service contracts.[176]

The second spill containment initiative is being coordinated by Helix Energy Solutions Group, which played a major role in the Macondo well containment efforts. Helix is seeking industry participation to make permanent modifications to the equipment it used in responding to the Macondo blowout and spill. It offers more modest containment capacity than the Marine Well Containment Company—less than the 100,000 barrels per day without additional investment—but at a lower cost. Although Helix maintains that it is not in competition with the Marine Well Containment Company,[177] its system appears to be attracting the interest of many of the independent oil and gas producers in the Gulf, who have expressed concerns about cost of and access to the Marine Well Containment Company.[178]

The Marine Well Containment Company and Helix spill containment proposals are promising, but they have at least two fundamental limitations. First, the systems are not designed to contain all possible catastrophic failures, only the next *Deepwater Horizon*-type spill. For instance, while both systems are designed to contain quickly the kind of blowout that happened at Macondo, they would not be able to contain a spill of the type that occurred in the Gulf of Mexico in 1979 during the Ixtoc oil spill, where the rig collapsed on top of the well. In addition, neither the Marine Well Containment Company's planned capabilities nor Helix's go past 10,000 feet despite the fact that current drilling technology extends beyond this depth.

Second, and perhaps most important, it seems that neither the Marine Well Containment Company nor the Helix system is structured to ensure the long-term ability to innovate and adapt over time to the next frontiers and technologies. What resources, if any, either initiative will dedicate to research and development going forward are unclear. The Marine Well Containment Company, in particular, could become another Marine Spill Response Corporation (as described in Chapter 5)—an industry nonprofit initiative created in response to a major oil spill that becomes underfunded and fails to innovate over time—if

it does not implement specific policies and procedures to monitor and guarantee its long-term readiness as well as funding and investment levels.

The primary long-term goal of a spill containment company or consortia should be to ensure that an appropriate containment system is readily available to contain quickly spills in the Gulf of Mexico with the best available technology. Any spill containment company or consortia should ensure that it remains focused on this goal, even when doing so potentially conflicts with the short-term interests of its founding companies, in the case of Marine Well Containment Company, or the parent company, in the case of Helix. An independent advisory board, with representatives from industry, the federal government, state and local governments, and environmental groups could help keep any spill containment initiative focused on innovative, adaptive, effective spill response over the long term.

As next-generation equipment is developed, industry must ensure that its containment technology is compatible with its wells. For instance, it may be useful to consider design modifications to blowout preventer stacks that would allow for more expeditious hook-ups of injection and evacuation networks and hoses, reducing the capital costs and increasing the flexibility of the spill containment companies or consortia. Capping and containment options should also be developed in advance to contain blowouts from platform wells.

Managing Liability

The market has a financial mechanism for encouraging risk-managing behaviors: the cost of insurance. In the wake of *Deepwater Horizon* oil spill, early reports indicated that insurance premiums rose by as much as 15 to 25 percent in shallow waters and up to 50 percent for deepwater rigs.[179] An energy underwriter predicted that premiums for deepwater operations would rise 25–30 percent and by 100 percent for deepwater drilling.[180] Companies insure for many perils, and a major reinsurer has represented to the Commission that there is ample additional coverage for most risks. The significant exception is third-party liability, about which there remains considerable uncertainty.[181]

The liability cap. Under the Oil Pollution Act of 1990 (the Act), responsible parties, including the lessees of offshore facilities, are strictly liable for removal costs and certain damages resulting from a spill.[182] Compensable damages are defined in the Act.[183] Removal costs themselves are unlimited, but there is a cap on liability for damages: for offshore facilities, $75 million.[184] The cap does not apply in cases of gross negligence, violation of an applicable regulation, or acts of war, and does not limit the amount of civil or criminal fines that might be imposed for violations of federal law, such as the Clean Water Act, nor does it limit damages under state law.[185]

As it became apparent that the damages from the *Deepwater Horizon* oil spill were likely to be orders of magnitude greater than the existing cap, Congress began to consider raising that cap significantly (to as much as $10 billion) or even eliminating it altogether.[186] The arguments in favor of such a change are straightforward. The amount of potential damage caused by a major spill clearly exceeds the existing caps, and one cannot fairly assume

that the responsible party causing a future spill will, like BP, have sufficient resources to fully compensate for that damage. Nor should the spill's victims or federal taxpayers have to pay the bill for industry's shortcomings. Increasing liability limits would also serve as a powerful incentive for companies to pay closer attention to safety, including investing more in technology that promotes safer operations.

Notwithstanding these arguments in favor of at least raising the liability cap, legislative efforts quickly stalled when members of Congress learned more about the potential impact on the structure of the oil and gas industry. A substantial portion of the offshore industry in the Gulf is made up of smaller, independent operators who fear that they would be unable to afford the dramatically higher insurance premiums that would result from a significant raising or elimination of the cap.[187] The concern is that lifting the liability cap immediately could have a harmful, anticompetitive impact on the independents and their thousands of employees and other commercial interests. Both large and small firms argue that the result would be detrimental, among other reasons, because the independent producers develop many smaller and end-of-life oil fields that the larger firms find uneconomic.

Apart from the handful of major companies, like BP, none in the oil and gas industry have the ability to self-insure against a major accident. But under current law, no company operating in the Gulf has had to demonstrate financial capacity to cover liabilities amounting to anything close to the cost of the BP spill—extending into the tens of billions of dollars.[188] Analysts have suggested that the insurance industry could adjust over time to the demand for capacity.[189] In fact, Munich Re announced on September 12, 2010, that it has developed a new concept for insuring offshore oil drilling, which has the potential to create coverage on the order of $10–20 billion per drilling operation.[190] Other proposals include mutual insurance funds that would pool risks.[191] The effectiveness of such mechanisms is currently unknown.[192] Congress and industry are considering a series of more nuanced measures that, while raising the cap, also seek to anticipate and mitigate the potentially adverse impact on the smaller, independent operators in the Gulf without distorting incentives to avoid accidents to begin with, or to be adequately prepared to respond to and contain spills that do occur. None of these proposals had been enacted by the end of 2010.

The Challenge of Change

Changing institutional culture and behavior is rarely easy. Business interests naturally prefer stable laws and market conditions that allow planning and investments (which can run into the billions of dollars for extensive deepwater operations in the Gulf) based on a clear understanding of what the future holds. But in the aftermath of the *Deepwater Horizon* spill, the operating environment and legal regime have been in constant flux. Beginning with a drilling moratorium, the industry has been struggling since the spring to recover from the nation's loss of trust in the safety of its operations, especially in the deepwater Gulf.

The oil and gas industry needs now to regain that trust, but doing so will require it to take bold action to make clear that business will no longer be conducted as usual in the Gulf. Industry must seize the opportunity to demonstrate that it is fully committed to subjecting its own internal operations to fundamental change and not merely because it is being forced to do so. Underscoring the sincerity and depth of their commitment to embracing a new safety culture, company leaders will need to lead the effort to guarantee that risk management improves throughout the industry to ensure that the mistakes made at the Macondo well are not repeated. And those leaders must also demonstrate an equal commitment to ensuring adequate containment and response technology and resources in case another spill happens. Only then will the oil and gas industry truly demonstrate that it is ready, willing, and able to engage in the kind of responsible offshore drilling practices upon which the nation's basic energy supplies depend.

Chapter Nine

"Develop options for guarding against, and mitigating the impact of, oil spills associated with offshore drilling."

Investing in Safety, Investing in Response, Investing in the Gulf

Introduction

The President asked this Commission to "develop options for guarding against, and mitigating the impact of, oil spills associated with offshore drilling"[1] in recognition of the compelling need to balance the nation's interest in offshore energy resources with protection of our rich marine and coastal environments. To that end, previous chapters of this report have detailed the complex web of decisions, actions, and circumstances

Ugly fallout from the spill, tarballs foul a beach near Venice, Louisiana. The report sets out a broad array of recommendations for action by the federal government to better manage and protect the nation's offshore energy resources. Two overarching and convergent goals: minimize the risk of another major spill along with its economic and environmental consequences—and be prepared when it happens.

< Win McNamee/Getty Images

that set the stage for the BP *Deepwater Horizon* disaster. Among the chief actors in that web was the government itself, which played a key role both in setting the policies that shaped offshore oil and gas activities in the Gulf over the course of many decades, and in overseeing responses to the spill once it began.

This chapter presents the Commission's recommendations for addressing the causes and consequences of the spill with a focus on the government's role (recommendations targeted to industry are presented in Chapter 8). The recommendations reflect the government's sweeping sovereign authority as both owner of the seabed and water column and as the regulator of activities, with the overriding responsibility to manage and protect the valuable resources of the Outer Continental Shelf (OCS) on behalf of current and future generations of Americans. They are grouped in seven distinct areas:

A. Improving the Safety of Offshore Operations
B. Safeguarding the Environment
C. Strengthening Oil Spill Response, Planning, and Capacity
D. Advancing Well-Containment Capabilities
E. Overcoming the Impacts of the *Deepwater Horizon* Spill and Restoring the Gulf
F. Ensuring Financial Responsibility
G. Promoting Congressional Engagement to Ensure Responsible Offshore Drilling

The sections that follow summarize the context and rationale for each of the Commission's specific recommendations. Other chapters of this report, as well as staff working papers published by the Commission and available at www.oilspillcommission.gov,* provide additional detail and further support for the recommendations. Chapter 10 presents additional recommendations concerning the future of offshore drilling, including prospective drilling in the Arctic.

A. Improving the Safety of Offshore Operations

As detailed in Chapters 3 and 4, and in staff working papers, federal efforts to regulate the offshore oil and gas industry have suffered for years from cross-cutting purposes, pressure from political and industry interests, a deepening deficit of technical expertise, and severely inadequate resources available to the government agencies tasked with the leasing function and regulation. In the aftermath of the *Deepwater Horizon* oil spill, the Department of the Interior has already taken a series of significant and important steps to improve regulatory oversight of offshore drilling. But given the deep-rooted problems that had existed at the Department's Minerals Management Service (MMS) before the spill occurred, and the near certainty that the oil and gas industry will seek to expand into ever more challenging environments in the years ahead, a more comprehensive overhaul of both leasing and the regulatory policies and institutions used to oversee offshore activities is required. The necessary overhaul, to be successful, must address three core issues: (1) reducing and managing risk more effectively using strategies that can keep pace with a technologically

* A list of staff working papers can be found in Appendix F.

complex and rapidly evolving industry, particularly in high-risk and frontier areas; (2) assuring the independence and integrity of government institutions charged with protecting the public interest; and (3) securing the resources needed to provide a robust capability to execute the leasing function and adequate regulatory oversight.

1. The Need for a New Approach to Risk Assessment and Management

As described in Chapter 3 and staff working papers, neither the industry's nor the federal government's approaches to managing and overseeing the leasing and development of offshore resources have kept pace with rapid changes in the technology, practices, and risks associated with the different geological and ocean environments being explored and developed for oil and gas production. Nor do these approaches reflect the significant changes that have occurred in the structure of the oil and gas industry itself—especially the rise of specialized service contractors and the general trend toward outsourcing multiple functions. When the operator directly regulated by the government does not itself perform many of the activities critical to well safety, regulators face additional challenges due to the separation of these functions. However, MMS did not change its regulatory oversight to respond to these industry changes by making the service companies more accountable. In other countries, operators of drilling are required to demonstrate to the regulators their own fitness and risk management systems.

Also missing has been any systematic updating of the risk assessment and risk management tools used as the basis for regulation. MMS attempted under several administrations to promulgate regulations that would have required companies to manage all of their activities and facilities, and those of their contractors, under a documented Safety and Environmental Management System (SEMS). But, in the face of industry opposition, MMS did not adopt such a requirement until September 2010, after the BP *Deepwater Horizon* disaster. Industry objections also derailed a past MMS proposal to expand data reporting requirements as part of an effort to track and analyze offshore incidents and to identify safety trends and lagging and leading indicators. The proposal was abandoned when the Office of Management and Budget agreed with industry complaints about compliance cost (industry also complained about the potential for overlap with Coast Guard reporting requirements). As a result, there has historically been no legal requirement that industry track or report instances of uncontrolled hydrocarbon releases or "near misses"—both indicators that could point to a heightened potential for serious accidents. The United States has the highest reported rate of fatalities in offshore oil and gas drilling among its international peers, but it has the lowest reporting of injuries. This striking contrast suggests a significant under-reporting of injuries in the United States and highlights the need for better data collection to ensure needed attention to worker safety.

Government agencies that regulate offshore activity should reorient their regulatory approaches to integrate more sophisticated risk assessment and risk management practices into their oversight of energy developers operating offshore. They should shift their focus from prescriptive regulations covering only the operator to a foundation of augmented prescriptive regulations, including those relating to well design and integrity, supplemented by a proactive, risk-based performance approach that is specific to individual facilities,

operations, and environments. This would be similar to the "safety case"* approach that is used in the North Sea, which requires the operator and drilling rig owners to assess the risks associated with a specific operation, develop a coordinated plan to manage those risks, integrate all involved contractors in a safety management system, and take responsibility for developing and managing the risk management process.

To accomplish these goals of creating a new approach to risk assessment and management, the Commission offers the following three recommendations:

Recommendations

A1: The Department of the Interior should supplement the risk-management program with prescriptive safety and pollution-prevention standards that are developed and selected in consultation with international regulatory peers and that are at least as rigorous as the leasing terms and regulatory requirements in peer oil-producing nations.

A2: The Department of the Interior should develop a proactive, risk-based performance approach specific to individual facilities, operations and environments, similar to the "safety case" approach in the North Sea.

A3: Working with the International Regulators' Forum and other organizations, Congress and the Department of the Interior should identify those drilling, production, and emergency-response standards that best protect offshore workers and the environment, and initiate new standards and revisions to fill gaps and correct deficiencies. These standards should be applied throughout the Gulf of Mexico, in the Arctic, and globally wherever the international industry operates. Standards should be updated at least every five years as under the formal review process of the International Organization for Standardization (ISO).

More specifically, the following actions are needed to truly transition to a proactive, risk-based performance approach:

- Engage a competent, independent engineering consultant to review existing regulations for adequacy and "fit for purpose" as a first step toward benchmarking U.S. regulations against the highest international standards. Following this review, develop and implement regulations for safety and environmental protection that are at least as rigorous as the regulations in peer oil-producing nations. A new regulatory entity for safety and environment (as described below) should ensure that while engaged in petroleum activities all drilling and production platforms are certified and operating at the highest level of international regulatory practice.

- Require operators to develop a comprehensive "safety case" as part of their exploration and production plans—initially for ultra-deepwater (more than 5,000

* The term "safety case" is a shorthand expression for a comprehensive and structured set of safety documentation that provides a basis for determining whether a risk management system for a specific vessel or equipment is adequately safe for a given application in a given environment.

feet) areas, areas with complex geology, and any other frontier or high-risk areas—such as the Arctic. In addition, for lease sales in those and other areas, prospective lessees should be required to demonstrate competence, based on experience, financial capacity, and expertise, as a prequalification for bidding.

- Expand Safety Environmental Management System requirements to include regular third-party audits at three- to five-year intervals and certification. These plans should be expanded for frontier areas to encompass the full range of risk assessment and management.

- For both new and transferred leases, require the operator to participate in a new safety institute or agree to expert audits, and to contribute to safety and environmental research and development. Approval to transfer leases sold prior to this requirement should be conditioned on the new requirements based on risk factors related to the specific requirements of the lease. The lease stipulation should also include the requirement that the operator possess adequate capability to contain and respond to an oil spill, and sufficient financial capacity to compensate for damages caused by a spill.

- To cultivate and maintain government expertise on offshore drilling safety:

  (1) Establish a process under the auspices of the National Academy of Engineering to identify criteria for high-risk wells and develop methodology to assess those risks. This process should include, to the extent that the National Academy deems appropriate, input from experts in the U.S. Geological Survey, the Department of Energy, NOAA, and academia. Furthermore, the Department of the Interior should develop in-house competence to perform such sophisticated risk assessments. Such evaluations could guide the transition to a system where all operators and contractors are required to demonstrate an integrated, proactive, risk management approach prior to leases being granted or receiving permits for exploration wells and major development projects. As noted above, these efforts should initially focus on areas with complex geology, ultra-deep water, and any other frontier or high-risk areas—such as the Arctic.

  (2) Establish a coordinated, interagency research effort to develop safer systems, equipment, and practices to prevent failures of both design and equipment in the future. The federal government has relevant expertise in areas such as the application of remote sensing and diagnostics, sensors and instrumentation, and command electronics that could and should be transferred to the offshore industry.* The Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Program, an existing research and development program created by statute and managed by the Secretary of Energy, should be refocused toward mitigating the risks of offshore operations.

* Secretary of Energy Steven Chu advised the Commission on the capacity within the Department of Energy, the Nuclear Regulatory Commission, the Federal Aviation Administration and elsewhere in the federal government to undertake sophisticated risk and technology assessments. The Department of Energy and the national laboratories have the depth and breadth of research and technical experience in such areas as high-performance computing, image processing, mechanical/structural stress analysis, complex fluid flow simulations, and other areas that proved instrumental in diagnosing the state of the Macondo well blowout preventer and in assessing plans to stop the leak.

- Develop more detailed requirements for incident reporting and data concerning offshore incidents and "near misses." Such data collection would allow for better tracking of incidents and stronger risk assessments and analysis. In particular, such reporting should be publicly available and should apply to all offshore activities, including incidents relating to helicopters and supply vessels, regardless of whether these incidents occur on or at actual drilling rigs or production facilities. In addition, Interior, in cooperation with the International Regulators Forum, should take the lead in developing international standards for incident reporting in order to develop a consistent, global set of data regarding fatalities, injuries, hydrocarbon releases, and other accidents. Sharing information as to what went wrong in offshore operations, regardless of location, is key to avoiding such mistakes.

- Lead in the development and adoption of shared international standards, particularly in the Gulf of Mexico and the Arctic. Transparent information and data sharing within the offshore industry and among international regulators is critical to continuous improvement in standards and risk management practices. The United States shares the waters of the Gulf of Mexico and its sub-surface resources with Cuba and the Republic of Mexico. After many decades of declining investment and production in the Mexican part of the Gulf by PEMEX, the national oil company, a recent Mexican Supreme Court ruling has created the opportunity for U.S. and other foreign oil and gas companies to enter Mexican waters. PEMEX has indicated its intention to auction deepwater contracts beginning in 2012. Separately, Cuba has already leased blocks 50 miles off the coast of Florida with reported plans for seven exploration wells by 2014. Agreement on standards for operations should be part of any negotiation to define the maritime boundary between the United States, Mexico, and Cuba in the eastern Gulf of Mexico. The need for international standards for activities in the Arctic is also unquestioned: the United States has already awarded leases in the region and now it is incumbent on the United States to push for such standards.

- Provide protection for "whistleblowers" who notify authorities about lapses in safety. All offshore workers have a duty to ensure safe operating practices to prevent accidents. To ensure all workers, regardless of employer, will take appropriate action whenever necessary, Congress should amend the Outer Continental Shelf Lands Act or specific safety statutes to provide the same whistleblower protection that workers are guaranteed in other comparable settings.

2. The Need for a New, Independent Agency

As described in detail in Chapter 3, primary responsibility for regulating the offshore oil and gas industry prior to the *Deepwater Horizon* accident was consolidated in a single agency, MMS. MMS was not only responsible for offshore leasing and resource management; it also collected and disbursed revenues from offshore leasing, conducted environmental reviews, reviewed plans and issued permits, conducted audits and inspections, and enforced safety and environmental regulations. And though the revenue management and resource management functions of MMS were separated into two distinct divisions, the mingling of distinct statutory responsibilities—each of which

required different skill sets and fostered different institutional cultures—led inevitably to internal tensions and a confusion of goals that weakened the agency's effectiveness and made it more susceptible to outside pressures.

At the core of this tension was a trade-off between, on the one hand, promoting the "expeditious and orderly development" of offshore resources, as mandated by the Outer Continental Lands Act of 1978, while also ensuring, on the other hand, that offshore development proceeded in a manner that protected human health, safety, and the environment. Over the course of many years, political pressure generated by a demand for lease revenues and industry pressure to expand access and expedite permit approvals and other regulatory processes often combined to push MMS toward elevating the former goal over the latter. At the same time, the fact that MMS lacked either a clearly articulated mission or adequate guidance for balancing its different missions led to inefficient management and a tendency to defer to industry, which successfully sought congressional and political intervention to shorten time frames for plan and permit reviews, blocked royalty valuation rulemakings, and advocated to delay and weaken rules aimed at improving the safety management of operations.

All of these problems were compounded by an outdated organizational structure, a chronic shortage of resources, a lack of sufficient technological expertise, and the inherent difficulty of coordinating effectively with all the other government agencies that had statutory responsibility for some aspect of offshore oil and gas activities. Besides MMS, other offices of the Department of the Interior as well as the Departments of Transportation, Commerce, Defense, and Homeland Security, and the Environmental Protection Agency (EPA) were involved in some aspect of the industry and its many-faceted facilities and operations, from workers on production platforms to pipelines, helicopters, drilling rigs, and supply vessels.

Not surprisingly, the Macondo well failure in April 2010 turned a harsh spotlight on all these bureaucratic inadequacies and shortcomings. And shortly after the accident, Interior Secretary Ken Salazar renamed MMS the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) and announced a plan to split its responsibilities into three separate offices.*

Although the proposed reorganization of Interior's offshore leasing, safety, and revenue management program represents a significant improvement, it does not adequately address the deeper problem of fully insulating the Department's safety and environmental protection functions from the pressures to increase production and maximize lease revenues.

* The use of "BOEMRE" will be limited here to actions since MMS was renamed.

Recommendations

A4: Congress and the Department of the Interior should create an independent agency within the Department of the Interior with enforcement authority to oversee all aspects of offshore drilling safety (operational and occupational), as well as the structural and operational integrity of all offshore energy production facilities, including both oil and gas production and renewable energy production.

A5: Congress and the Department of the Interior should provide a mechanism, including the use of lease provisions for the payment of regulatory fees, for adequate, stable, and secure funding to the key regulatory agencies—Interior, Coast Guard, and NOAA—to ensure that they can perform their duties, expedite permits and reviews as needed, and hire experienced engineers, inspectors, scientists, and first responders. (See Recommendation G2.)

The roles and responsibilities of the former MMS should be separated into three entities with clearly defined statutory authorities. One entity would be responsible for offshore safety and environmental enforcement; another would perform functions related to leasing and environmental science; and the third would manage natural resource revenues. The safety and environment enforcement authority or entity, in particular, should have primary statutory responsibility for overseeing the structural and operational integrity of all offshore energy-related facilities and activities, including both oil and gas offshore drilling and renewable energy facilities.

- A new office of safety should consolidate responsibility for safety—including infrastructure and operational integrity, as well as spill prevention and response—for all offshore fossil fuel and renewable resource development activities, structures, and workers. It should be an independent agency housed at the Department of the Interior to facilitate coordination with a new office for leasing and environmental science. Congress should enact an organic act to establish its authorities and responsibilities, consolidating the various responsibilities now under the Outer Continental Shelf Lands Act, the Pipeline Safety Act, and Coast Guard authorizations. The new office should have primary authority over facilities, structures, and units for offshore oil and gas drilling, production, and renewable energy that are engaged in energy-related activities, including authority to establish and enforce specific safety and environmental protection requirements for these units as well as requirements for operators who may be leasing the facilities.

- Congress should review and consider amending where necessary the governing statutes for all agencies involved in offshore activities to be consistent with the responsibilities functionally assigned to those agencies. The safety-related responsibilities of the new offshore safety agency should be included in a separate statute. (Further specifics regarding the Commission's recommended organizational structure for new offices to regulate safety and leasing are discussed below).

- To ensure that Interior has the ability to provide adequate leasing capabilities and regulatory oversight for the increasingly complex energy-related activities being undertaken on the OCS, budgets for these new offices as well as existing agencies should come directly from fees paid by the offshore industry, akin to how fees charged to the telecommunications industry pay for the expenses of the Federal Communications Commission, which is essentially fully funded by such regulated industry payments. Through this mechanism, Congress, through legislation, and Interior, through lease provisions,[2] could expressly oblige lessees to fund the regulation necessary to allow for private industry access to the energy resources on the OCS, including renewables. Under existing law, the oil and gas industry already pays inspection fees that currently amount to about $10 million per year or about 3 percent of BOEMRE's annual budget, but this amount can and should be increased significantly. (See Recommendation G2.)

Implementing the Commission's recommendation to reorganize the former MMS into three offices and to enhance these offices' technical capacities will require a sustained effort over a period of years. The President or Interior Secretary should effect this reorganization to the extent possible administratively and request congressional enactment to confirm its permanence and provide for the statutory recognition of a term of office for the director of safety and environmental regulation.

PROPOSED REORGANIZATION OF THE FORMER MINERALS MANAGEMENT SERVICE

Offshore Safety Authority: This office would exercise independent statutory authority over technical and operational safety in all phases of OCS energy resource development projects, including the planning, designing, constructing, operating, and decommissioning of facilities and projects, and will have overall responsibility for fostering safe and environmentally sound offshore energy operations. The new agency would oversee all non-economic aspects of the operations and structures involved in drilling and production of oil and gas, pipelines, and wind towers, wave, tidal, and other renewable technologies located on the federal offshore zone. The new safety and environment authority would also have the lead coordination role in relation to other regulators with independent authority over offshore oil and gas activities, including EPA, NOAA and the Coast Guard.

Key responsibilities include:

- Reviewing and approving (or denying) all permits under exploration, development, and production plans.
- Inspecting all offshore operations by expert teams through scheduled and unannounced inspections.
- Auditing or otherwise requiring certification of operator health, safety, and environmental management systems.

- Evaluating eligibility for lessees based on safety and environmental qualifications.
- Reviewing and approving the safety and feasibility of any environmental mitigation activities prescribed by National Environmental Policy Act (NEPA) documents and other environmental consultations, authorization, or permits in addition to enforcing such requirements over the duration of an operation.
- Collecting and analyzing leading and lagging indicators from all active parties for full risk evaluation.
- Promulgating all structural integrity, process, and workplace safety rules and regulations in order to create a foundation of prescriptive regulations to supplement performance-based ("safety case") regulations.
- Providing technical review and comment on the five-year leasing program and individual lease sales.
- Providing technical review of spill response and containment plans.
- Reviewing and approving all spill response and containment plans and advising the new safety authority on environmental considerations.
- Investigating all accidents and other significant events that could have potentially turned catastrophic.

The organization and staffing composition should be decided during a transition period, when the areas and activities are analyzed and categorized by risk. The director of the new organization should be a qualified executive with a relevant engineering or technical background, and should be appointed by the President for a five- to six-year term and confirmed by the Senate. In addition, the new agency should have classifications and salary scales for engineering and technical staff and inspectors similar to those of the Nuclear Regulatory Commission.

Leasing and Environmental Science Office: This office would act as the leasing and resource manager for conventional and renewable energy and other mineral resources on the OCS. Charged with fostering environmentally responsible and efficient development of the OCS, the office would ensure that the American people both receive fair market value for the rights conveyed and that the nation's rich marine environment remains protected. The United States cannot afford a repetition of the kind of contractual drafting mistake that, as described in Chapter 3, is literally costing the nation tens of billions of dollars in lost revenues.

Key responsibilities include:

- Conducting OCS resource planning processes, including the five-year leasing program and individual lease sales.
- Conducting individual lease sales for oil, gas, and renewable energy facilities offshore.
- Promulgating rules and regulations with respect to lease terms, resource access, and use.
- Approving non-engineering or operations aspects of exploration, development, and production plans, subject to review by the new safety authority to ensure no conflicts with permitting requirements for infrastructure and operations.
- Reviewing and approving all spill response and containment plans and advising the new safety authority on environmental considerations.
- Making resource management decisions, such as those related to timing of reservoir abandonment and shared reservoir issues, unitization, commingling, and optimizing oil and gas recovery.
- Reviewing and approving permits for seismic activities.
- Conducting NEPA reviews at all relevant phases and coordinating other environmental reviews when appropriate
- Administering the Environmental Studies Program.

The leasing and environmental science office would include two distinct divisions: a leasing and resource evaluation division and an environmental science division. To provide an important and equitable voice for environmental concerns during the five-year planning process and lease awards, the environmental science division would be structured with a separate line of reporting to the Assistant Secretary overseeing offshore drilling and the environmental science division would be led by a Chief Scientist. The Chief Scientist's responsibilities would include, but not be limited to, conducting all NEPA reviews and coordinating other environmental reviews when appropriate and administering the Environmental Studies Program. The Chief Scientist's expert judgment on environmental protection concerns would be accorded significant weight in the leasing decision-making process, including on questions concerning whether and where leasing should occur and what environmental protection and mitigation conditions should be placed on leases that are issued. The new organization and process would also include enhanced review of environmental decisions and enforcement by the safety authority. It should track all mitigation efforts from NEPA documents and other environmental reviews to assist the new safety authority in its environmental enforcement duties.

Office of Natural Resources Revenue (ONRR): Revenue collection and auditing functions would remain with the Assistant Secretary for Policy, Management, and Budget as per the recent re-organization implemented by Secretary Salazar.

B. Safeguarding the Environment

The adequacy of the existing regulatory regime to assure the environmental safety of offshore drilling (as distinct from worker or occupational safety) has come under a great deal of scrutiny since the *Deepwater Horizon* incident. In its work on this question, the Commission focused on two issues: (1) the application of NEPA requirements to the offshore leasing process and (2) the need for better science and greater interagency consultation to improve decision-making concerning the management of offshore resources.

1. The Need to Revise and Strengthen NEPA Policies and Practices in the Offshore Drilling Context

The Commission has reviewed the leasing and permitting processes that MMS followed in the Gulf of Mexico before the *Deepwater Horizon* incident. The results lead the Commission to conclude that the breakdown of the environmental review process for OCS activities was systemic and that Interior's approach to the application of NEPA requirements in the offshore oil and gas context needs significant revision. In particular, the application of tiering, the use of categorical exclusions, the practice of area-wide leasing, and the failure to develop formal NEPA guidance for the agency all contributed to this breakdown.

Tiering. Under MMS, the NEPA process for offshore oil and gas leasing relied heavily on "tiering"—a practice under which a broad environmental impact statement was used to cover "general matters" across a large area, while issues specific to a particular site or smaller area were addressed through "subsequent narrower statements of environmental analyses."[3] Tiering was meant to encourage more thorough reviews at each subsequent stage of the offshore leasing process, and to avoid the duplication of general information that would have been covered in previous environmental reviews. As applied by MMS, however, tiering was not always consistent with its original purpose: instead, it created a system where deeper environmental analysis at more geographically targeted and advanced planning stages did not always take place.

Categorical Exclusions. The Council on Environmental Quality's implementing regulations for NEPA define "categorical exclusions" as "a category of actions which do not individually or cumulatively have a significant effect on the human environment . . . and for which, therefore, neither an environmental assessment nor an environmental impact statement is required."[4] MMS has historically applied categorical exclusions to both Exploration Plans and Development Operations Coordination Documents[5] in the Gulf of Mexico. Although there are legitimate differences between the Gulf and other regions of the OCS, the basis for such a wide

disparity in the use of categorical exclusions is questionable. And in the aftermath of the BP *Deepwater Horizon* spill, it is difficult to argue that deepwater drilling is an activity that does not present at least some potentially significant risk of harm to the environment of the Gulf. That is no doubt why, prompted by a comprehensive review of MMS's use of categorical exclusions by the Council on Environmental Quality, Interior announced in August 2010 that it would restrict its use of categorical exclusions for offshore oil and gas development "to activities involving limited environmental risk," while it undertakes a comprehensive review of its NEPA process.[6]

Area-Wide Leasing. OCS lease sales cover such large geographic areas that meaningful NEPA review is difficult. A decision to dramatically increase the size of lease sales—known as area-wide leasing—was made over 20 years ago at the request of industry; it has necessitated environmental analyses of very large areas at the lease sale stage. For example, the Final Environmental Impact Statement for the 2007–2012 multi-lease sales in the Gulf of Mexico covered more than 87 million acres,[7] while the Final Environmental Impact Statement for Chukchi Sea Lease Sale 193 covered about 34 million acres.[8] Given that 2008 lease sales in the Central Gulf of Mexico and the Chukchi Sea attracted almost $3.7 billion and almost $2.7 billion in high bids, respectively, it is appropriate to conduct environmental reviews on a finer geographic scale before private-sector commitments of this magnitude are made to purchase leases.

NEPA Guidance. Though expected to prepare a handbook on NEPA requirements,[9] MMS never developed formal NEPA guidance. As the Government Accountability Office noted in a review of the MMS Alaska Region Office: "The lack of a comprehensive NEPA guidance handbook, combined with high staff turnover, leaves the process for meeting NEPA requirements ill-defined for the analysts charged with developing NEPA documents."[10] BOEMRE is currently in the process of developing an internal NEPA guidance document—a step that should ensure a higher level of NEPA consistency and transparency across regions.

Recommendation

B1: The Council on Environmental Quality and the Department of the Interior should revise and strengthen the NEPA policies, practices, and procedures to improve the level of environmental analysis, transparency, and consistency at all stages of the OCS planning, leasing, exploration, and development process.

Interior should take the following steps to strengthen NEPA review of the offshore leasing process:

- The new office of leasing and environmental science should, in consultation with the Council on Environmental Quality, develop and make public a formal NEPA handbook within one year. The handbook should address the issue of tiering and provide guidelines for applying NEPA in a consistent, transparent, and appropriate manner to decisions affecting OCS oil and gas activities.

- Interior should require, through this formal NEPA handbook, environmental impact statements for both the Five-Year Plan and for specific lease sales before plans for exploration, development, and production are approved in areas with complex geology, in ultra-deepwater, and in the Arctic and other frontier areas. Exploration plans and development and production plans in all other areas should be subject to NEPA review consistent with the Council on Environmental Quality's implementing regulations.

- In less well-explored areas, Interior should reduce the size of lease sales so their geographic scope allows for a meaningful analysis of potential environmental impacts and identification of areas of ecological significance. A bidder on tracts in these areas and all other areas should be able to demonstrate, in addition to financial prequalification and ability to contain a maximum-size spill, experience operating in similar environments and a record of safe, environmentally responsible operation—either in the United States or as verified by a peer regulator for another country. The distinction between the OCS and less well-explored areas in the Gulf should be defined by the new entity in charge of leasing and environmental science.

- Congress should amend the Outer Continental Shelf Lands Act to extend the 30-day deadline for approving exploration plans to 60 days. In addition, MMS should not consider such plans officially "submitted" until all of the required content, necessary environmental reviews, and other analyses are complete and adequate to provide a sound basis for decision-making. Exploration and development plans would be considered higher-level plans for purposes of agency review and approval under a reorganized regulatory structure. The office of safety and environment, separate from the office (or division) of leasing, would be responsible for permitting and approving well designs, drilling plans, and any structures.

2. The Need for Greater Interagency Consultation

Under OCSLA, it is up to the Secretary of the Interior to choose the proper balance between environmental protection and resource development. In making leasing decisions, the Secretary is required to solicit and consider suggestions from any interested agency, but he or she is not required to respond to the comments or accord them any particular weight. Similar issues arise at the individual lease sale stage and at the development and production plan stage. As a result, NOAA—the nation's ocean agency with the most expertise in marine science and the management of living marine resources—effectively has the same limited role as the general public in the decisions on selecting where and when to lease portions of the OCS. A more robust and formal interagency consultation process is needed—with the goal of identifying precise areas that should be excluded from lease sales because of their high ecological importance or sensitivity. In addition to NOAA, other federal agencies that should be involved include the U.S. Fish and Wildlife Service and EPA.

Strengthened interagency coordination on offshore oil and gas activities will also be important in implementing the final recommendations of the Interagency Ocean Policy Task Force. These recommendations, adopted by President Obama by Executive Order on July 19, 2010, mandate a new national ocean policy that includes a framework for coastal

and marine spatial planning, as well as a comprehensive, adaptive, integrated, transparent, ecosystem- and science-based process for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas.[11] Coastal and marine spatial planning applies a multi-sector approach in an effort to simultaneously reduce user conflicts and environmental impacts associated with ocean and coastal activities. Integrating five-year leasing plans and associated leasing decisions with the coastal and marine spatial planning process will be an important step toward assuring the sustainable use of ocean and coastal ecosystems. It could also reduce uncertainty for industry and provide greater predictability for potential users of different areas.

To ensure that offshore oil and gas development and production proceed in ways that minimize adverse impacts to the natural and human environment, decisions about these activities must be grounded in strong science. With respect to funding the necessary science, the Outer Continental Shelf Lands Act requires Interior to study the "assessment and management of environmental impacts on the outer Continental Shelf and coastal areas that might be affected by oil and gas or other mineral developments. . . ."[12] Initiated in 1973, funding for the Environmental Studies Program at Interior peaked in 1976 at roughly $55 million, but had fallen to less than $20 million during most of the 1990s and 2000s. It was only recently increased to approximately $30 million.[13]

Future research must be conducted in a systematic way that strategically enhances understanding of the impacts of oil and gas activities and provides regulators with the timely and scale-appropriate information required for sound decisions. Long-term studies that provide critical scientific information on OCS frontier or lesser known areas,* or systematic efforts to fill data gaps in areas with existing oil and gas activity, can help ensure that the selection of new leasing areas is informed by a full understanding of potential impacts on important ecological resources. In frontier areas, it will be important to collect data on prevailing environmental conditions on a broad geographic scale, not just at individual lease sites. Additionally, post-development ecological monitoring is critical to understanding the impacts of oil and gas activities and to facilitate an adaptive approach to environmental management. Expanded coordination and cooperation on scientific research efforts with NOAA, the U.S. Geological Survey, and other agencies with relevant expertise can improve the quality of science available for OCS decision-making. Much of this research will also be relevant to other offshore activities, including the development of offshore wind resources.

Recommendations

B2: The Department of the Interior should reduce risk to the environment from OCS oil and gas activities by strengthening science and interagency consultations in the OCS oil and gas decision-making process.

* The term "frontier areas" include areas of the OCS that either have never been leased, or have not been leased in many years. It includes the Arctic (Beaufort and Chukchi Seas) and the Atlantic and portions of the Pacific.

B3: Congress, by enacting legislation, and the Department of the Interior, through its lease provision, should require the oil and gas industry to pay fees that support environmental science and regulatory review related to OCS oil and gas activities to enable cooperating agencies to carry out these responsibilities. (See Recommendation G2.)

Several actions are needed to implement these recommendations:

- Congress should amend the Outer Continental Shelf Lands Act to provide NOAA with a formal consultative role during the development of five-year lease plan and lease sale stages. Consultation should occur no later than 60 days in advance of final Department of the Interior decisions on lease plans and sales. Specifically, NOAA should provide comments and recommendations concerning specific geographic areas that should be excluded from the leasing program or treated in a specific manner due to their ecological sensitivity or for other reasons relevant to NOAA's ocean and coastal science expertise. Interior must adopt NOAA's recommendations unless the Department determines that doing so would be inconsistent with important national policy interests. Moreover, Interior must publish in writing its rationale for rejecting NOAA's recommendation.

- The Department of Energy, NOAA, the U.S. Geological Survey, and other interested agencies should establish a joint research program to systematically collect critical scientific data, fill research gaps, and provide comprehensive, ecosystem-based scientific reviews of OCS areas that are currently or will likely be open for oil and gas leasing, and for offshore areas being considered for the siting of sources of renewable energy such as wind power. This program should build on existing data; should aim to supplement data collected from individual lease sites by industry to develop information for broader geographic areas; and should engage the non-federal scientific community through such mechanisms as the National Oceanographic Partnership Program. The research should outline and develop the necessary data for: (1) decision-making related to future leasing, exploration, and development; (2) measuring and monitoring impacts on ecological resources; and (3) providing necessary data for natural resource damage assessment should an oil spill occur.

- The National Academy of Sciences should regularly evaluate the government's studies program in this area, preferably at five-year intervals.

- Together with NOAA, the new division of environmental science under the direction of the Chief Scientist in the Office of Leasing and Environmental Science should develop an environmental monitoring program or set of protocols to be implemented by oil and gas companies at lease sites once exploration and development and production activities begin. Areas of ecological interest and areas where data gaps exist should be targeted for monitoring programs. In addition, monitoring should be conducted in a way that is independently verifiable and allows for comparisons across individual sites. Companies should provide all monitoring data to the federal government.

- NOAA and other federal agencies with appropriate expertise should be encouraged to act as cooperating agencies in NEPA reviews of offshore energy production activities, including exploration and development plans and drilling permit applications. Federal agencies that submit comments to Interior as part of a NEPA process should receive a written response indicating how the information was applied and if it was not included, why it was not included.

C. Strengthening Oil Spill Response, Planning, and Capacity

Just as the events of April 20, 2010 exposed a regulatory regime that had not kept up with the industry it was responsible for overseeing, the events that unfolded in subsequent weeks and months made it dismayingly clear that neither BP nor the federal government was prepared to deal with a spill of the magnitude and complexity of the *Deepwater Horizon* disaster. This section discusses the Commission's recommendations in the area of oil spill response and planning. Broadly speaking they address three critical issues or gaps in the government's existing response capacity: (1) the failure to plan effectively for a large-scale, difficult-to-contain spill in the deepwater environment or potentially in the Arctic; (2) the difficulty of coordinating with state and local government officials to deliver an effective response; and (3) a lack of information and understanding concerning the efficacy of specific response measures, such as dispersants and berms.

1. The Need for Improved Oil Spill Response Planning

Oil spill response planning and analysis across the government needs to be overhauled in light of the lessons of the *Deepwater Horizon* blowout. A common interagency approach to analyzing oil spill risks and a common understanding of the issues and impacts involved are needed and must be consistently incorporated in environmental reviews, consultations, and authorizations. Environmental review and spill planning currently occurs at different levels within the government and industry, and these reviews and plans have not been sufficiently coordinated to ensure either searching review of industry plans or adequate preparation.

One of the common threads that runs through many of the environmental review documents prepared for Gulf of Mexico oil and gas activities in the years leading up to the *Deepwater Horizon* spill was their reliance on MMS oil spill risk and impact analyses. To the extent that any of these documents contained errors or incomplete information, those gaps and errors carried through to subsequent environmental reviews by other agencies.

The government's spill-response planning occurs largely outside of MMS. The National Contingency Plan, mandated by the Clean Water Act, prescribes the nationwide response structure for spills of oil or releases of hazardous substances and creates a tiered planning process. Regional Response Teams include representation from federal agencies and state governments, and develop Regional Contingency Plans as well as preauthorization protocols for certain response strategies. The Area Committees, which develop Area

Contingency Plans, similarly include federal and state representatives but are led by the Coast Guard. (The Coast Guard and EPA co-chair the regional teams.) The Area Contingency Plans are the most specific and the most relied-upon during the response to a spill.

While industry spill response plans must "be consistent with the requirements of the National Contingency Plan and Area Contingency Plans,"[14] those industry plans presently require only the approval of BOEMRE.[15] Its regulations outline what needs to be included in these plans and direct the company to include information about a worst case scenario, including how to calculate the volume of oil, determine its trajectory, and a response strategy.[16] As noted above, MMS oil spill risk and impacts modeling formed the basis of the required analysis. These response plans were not distributed to any federal agencies for review and comment outside of MMS. Additionally, only a small number of the plans developed for the Gulf were sent to the existing Office of Leasing and Environment for detailed environmental review within MMS or shared with other federal agencies with relevant expertise, such as NOAA or the Coast Guard. Finally, no provision was made for any form of public review or comment, and plans were not available to the public after they received MMS approval.

Recommendation

C1: The Department of the Interior should create a rigorous, transparent, and meaningful oil spill risk analysis and planning process for the development and implementation of better oil spill response.

Several steps are needed to implement a rigorous, transparent, and meaningful oil spill risk analysis and planning process:

- Interior should review and revise its regulations and guidance for industry oil spill response plans in light of the lessons learned from the *Deepwater Horizon* experience.

- A new process for reviewing spill response plans is needed. This process should ensure that all critical information and spill scenarios are included in the plans, including oil spill containment and control methods to ensure that operators can deliver the capabilities indicated in their response plans. In addition, the new entity within Interior that is charged with overseeing offshore safety and environmental protection will have to verify operator capability to perform according to the plans.

- Interior must ensure that adequate technical expertise exists within the staff responsible for reviewing and approving spill response plans.

- In addition to the Department of the Interior, other agencies with relevant scientific and operational expertise should play a role in evaluating spill response plans to verify that operators can conduct the response and containment operations detailed in their plans. Specifically, oil spill response plans, including source-control measures, should be subject to interagency review and approval by the Coast Guard, EPA,

and NOAA. Other parts of the federal government, such as Department of Energy national laboratories that possess relevant scientific expertise, could be consulted. This would help remedy the past failure to integrate multiple area, regional, and industry response plans, by involving the agencies with primary responsibility for government spill response planning in oversight of industry planning. Plans should also be made available for a public comment period prior to final approval and response plans should be made available to the public following their approval.

- Interior should incorporate the "worst-case scenario" calculations from industry oil spill response plans into NEPA documents and other environmental analyses or reviews. This does not mean that Interior would be required to conduct a "worst-case scenario analysis" under NEPA, but it does mean that Interior would use industry's worst-case estimates for potential oil spill situations in its environmental analyses.

2. The Need for a New Approach to Handling Spills of National Significance

The Macondo well blowout caused the largest accidental oil spill in history—one that presented an unprecedented challenge to the response capability of both government and industry. Clearly, neither was adequately equipped: In fact it was quickly evident that even the response capacity indicated in industry's spill response plans did not exist. Though the National Contingency Plan permitted the government to designate the spill as one of "national significance," this designation did not trigger any procedures other than allowing the federal government to name a National Incident Commander.

The spill's magnitude calls into question whether the National Contingency Plan establishes an appropriate relationship between the federal government and the responsible party, as the public demanded in the weeks and months following the *Deepwater Horizon* spill that the government demonstrate control of the response. The responsible party that caused the spill is clearly legally responsible for containing the spill and mitigating its harmful consequences. The federal government, not the responsible party, must be in charge of those efforts. As this spill demonstrated, the government unfortunately lacked both the expertise and the capacity to oversee aspects of the response at the outset of the spill—particularly the effort to control the well. Only as the full scope of the disaster unfolded and the government gathered and focused its resources from a variety of agencies was the government ultimately able to take charge.

Recommendation

C2: EPA and the Coast Guard should establish distinct plans and procedures for responding to a "Spill of National Significance."

Under existing law, EPA is the federal agency responsible for developing a National Contingency Plan, which is the federal government's blueprint for responding to both oil spills and hazardous substances releases. In light of the *Deepwater Horizon* oil spill, EPA should amend or issue new guidance on the National Contingency Plan to add distinct plans and procedures for Spills of National Significance. In those amendments, EPA should:

- Increase government oversight of the responsible party, based on the National Contingency Plan's requirement that the government "direct" the response where a spill poses a substantial threat to public health or welfare.[17]

- Augment the National Response Team and Regional Response Team structures to establish additional frameworks for providing interagency scientific and policymaking expertise during a spill. Further, EPA, NOAA, and the Coast Guard should develop procedures to facilitate review and input from the scientific community—for example, by encouraging disclosure of underlying methodologies and data.

- Create a communications protocol that accounts for participation by high-level officials who may be less familiar with the National Contingency Plan structure and create a communications center within the National Incident Command—separate from the joint information center established in partnership with the responsible party—to help transmit consistent and complete information to the public.

3. The Need to Strengthen State and Local Involvement

The response to the *Deepwater Horizon* disaster showed that state and local elected officials had not been adequately involved in oil spill contingency planning, though career responders in state government had participated extensively in such planning. Before the *Deepwater Horizon* spill, state and local elected officials were not regular participants in Area Committee meetings or familiar with local Area Contingency Plans. The Coast Guard and Area Committee member agencies had done little to reach out to state and local elected officials. These state and local officials were more familiar with hurricane response under the Stafford Act, in which the federal government provides funding and supports state and local governments, but does not control emergency response operations. As a result, state and local political officials had incorrect expectations about their roles. They understandably wanted to be responsive to citizens who were concerned about the spill and, regardless of the official response plans, sought state and local governmental assistance.

Unfamiliarity with, and lack of trust in, the federal response manifested itself in competing state structures and attempts to control response operations that undercut the efficiency of the response overall. Federal responders improved their relationship with state and local officials as the response progressed—but had better coordination and communication existed sooner, that relationship could have been more productive in the early days of the spill response. Moreover, increased citizen involvement before a spill occurs could create better mechanisms to utilize local citizens in response efforts, provide an additional layer of review to prevent industry and government complacency, and increase public trust in response operations.

Recommendation

C3: EPA and the Coast Guard should bolster state and local involvement in oil spill contingency planning and training and create a mechanism for local involvement in spill planning and response similar to the Regional Citizens' Advisory Councils mandated by the Oil Pollution Act of 1990.

EPA and the Coast Guard, as the chair and vice-chair of the National Response Team, should issue policies and guidance for increased state and local involvement in oil spill contingency planning and training. This guidance should provide protocols to:

- Include local officials from areas at high risk for oil spills in training exercises.
- Establish liaisons between the Unified Command and affected local communities at the outset of a spill response.
- Add a local on-scene coordinator position to the Unified Command structure.
- Provide additional clarification and guidance to federal, state, and local officials on the differences between emergency response under the Stafford Act and under the National Contingency Plan.

In addition, a mechanism should be created for ongoing local involvement in spill planning and response in the Gulf. In the Oil Pollution Act of 1990, Congress mandated citizens' councils for Prince William Sound and Cook Inlet. In the Gulf, such a council should broadly represent the citizens' interests in the area, such as fishing and tourism, and possibly include representation from oil and gas workers as ex-officio, non-voting members. The citizens' group could be funded by Gulf lease holders. The Commission further recommends that federal regulators be required to consult with the council on relevant issues, that operators provide the council with access to records and other information, and that entities (either in industry or in government) declining the council's advice submit their reasons to the council in writing.

4. The Need for Increased Research and Development to Improve Spill Response

The technology available for cleaning up oil spills has improved only incrementally since 1990. Federal research and development programs in this area are underfunded: In fact, Congress has never appropriated even half the full amount authorized by the Oil Pollution Act of 1990 for oil spill research and development. In addition, the major oil companies have committed minimal resources to in-house research and development related to spill response technology. Oil spill removal organizations are underfunded in general and dedicate few if any resources to research and development. Though some commentators and industry representatives have argued that more research and development would not have allowed for a more effective spill response because no technology will ever collect more than a fraction of spilled oil, the fact is that neither industry nor government has made significant investments in improving the menu of response options or significantly improved their effectiveness. Thus any argument about the limited potential of response technology is speculative. After the *Deepwater Horizon* spill, agencies, industry, and entrepreneurs focused attention on developing new response technologies for the first time in 20 years, and a number of promising options emerged within a relatively short period of time—including beach-cleaning machines, subsea dispersant delivery systems, and new in situ burning techniques.

Recommendation

C4: Congress should provide mandatory funding for oil spill response research and development and provide incentives for private-sector research and development.

Specifically, Congress should provide mandatory funding (i.e. funding not subject to the annual appropriations process) at a level equal to or greater than the amount authorized by the Oil Pollution Act of 1990 to increase federal funding for oil spill response research by agencies such as Interior, the Coast Guard, EPA, and NOAA—including NOAA's Office of Response and Restoration. To be sure, such mandatory appropriations are rarely done, but they are not unprecedented. Congress has included such a provision when, as here, Congress seeks to target appropriations to support a discrete category of activities where Congress perceives that the need is high and the concern is great that the desired activity will otherwise go unfunded over a sustained period of time. For instance, Congress has provided for an annual mandatory appropriation of $100 million for emergency highway repairs for those damaged by natural disasters or catastrophic failures.[18] Congress also provided for mandatory funding for five years for several farm conservation programs in the Farm Security and Rural Investment Act of 2002.[19] By similarly removing oil spill research and development funding from the ordinary appropriations process, Congress can avoid the experience that followed the *Exxon Valdez* spill, when support for response research and development decreased over time. Moreover, Congress can comply with its pay-as-you-go rules by supporting increased research and development funding with a fee on offshore lessees. (See Recommendation G2.)

An advisory board, made up of experts from relevant offices of the Department of the Interior, U.S. Geological Survey, Department of Energy, EPA, and NOAA, as well as from professional societies, academia, industry, and non-governmental organizations, should be established to develop a research agenda and roadmap. In addition, to promote increased research investments by industry, the Coast Guard should revise its Effective Daily Recovery Capacity regulations to encourage the development and use of more efficient oil recovery equipment. At the same time, EPA should revise its oiled-water discharge regulations and streamline its permitting process for open-water testing. Finally, Congress and the Administration should encourage private investment in response technology more broadly, including through public-private partnerships and a tax credit for research and development in this area.

5. The Need for New Regulations to Govern the Use of Dispersants

The decision to use dispersants involves difficult tradeoffs: If dispersants are effective, less oil will reach shorelines and fragile marsh environments, but more dispersed oil will be spread throughout the water column. Prior to the *Deepwater Horizon* incident, the federal government had not adequately planned for the use of dispersants to address such a large and sustained oil spill, and did not have sufficient research on the long-term effects of dispersants and dispersed oil to guide its decision-making. Officials had to make decisions about dispersant use without important relevant information or the time to gather such information. Under the circumstances, however, the Commission believes that the National Incident Commander, Federal On-Scene Coordinators, and EPA Administrator

made reasonable decisions regarding the use of dispersants at the surface and in the subsea environment.

Recommendation

C5: EPA should update and periodically review its dispersant testing protocols for product listing or pre-approval, and modify the pre-approval process to include temporal duration, spatial reach, and volume of the spill.

EPA should update its dispersant testing protocols and require more comprehensive testing prior to listing or pre-approving dispersant products. The Coast Guard and EPA, as co-chairs of the Regional Response Teams and leaders of the Area Contingency Plan drafting process, should modify pre-approvals of dispersant use under the National Contingency Plan to establish procedures for further consultation based on the temporal duration, spatial reach, or volume of the spill and volume of dispersants that responders are seeking to apply. EPA and NOAA should conduct and encourage further research on dispersants, including research on the impacts of high-volume and subsea use of dispersants, the long-term fate and effects of dispersants and dispersed oil, and the development of less toxic dispersants.

6. The Need to Re-evaluate the Use of Offshore Barrier Berms in Spill Response

Offshore barrier berms generally do not constitute a viable spill response measure for several reasons. These reasons include the time and cost of construction, and the highly variable and dynamic marine environment that limit effectiveness and pose the potential for negative environmental impacts resulting from dredging and filling. Thus, for instance, barrier berms constructed off the shores of Louisiana in response to the *Deepwater Horizon* spill could not be considered a success. Only a fraction of the project (approximately 6 percent) was completed by the time the well was capped, and no estimate of the amount of oil trapped by the berms is much more than 1,000 total barrels. In fact, the Louisiana berms project stands out as the most expensive and perhaps most controversial response measure deployed to fight the *Deepwater Horizon* spill. The decision to approve the project as one of the oil spill response techniques to be funded by the responsible party was based primarily on the demands of local and regional interests rather than on a scientific assessment of its likely efficacy.

Recommendation

C6: The Coast Guard should issue guidance to establish that offshore barrier berms and similar dredged barriers generally will not be authorized as an oil spill response measure in the National Contingency Plan or any Area Contingency Plan.

D. Advancing Well-Containment Capabilities

As described in Chapter 5, the most obvious, immediately consequential, and plainly frustrating shortcoming of the oil spill response set in motion by the events of April 20, 2010 was the simple inability—of BP, of the federal government, or of any other potential intervener—to contain the flow of oil from the damaged Macondo well. Clearly, improving the technologies and methods available to cap or control a failed well in the extreme conditions thousands of feet below the sea is critical to restoring the public's confidence that deepwater oil and gas production can continue, and even expand into new areas, in a manner that does not pose unacceptable risks of another disaster. Better technology and methods are also needed to gather accurate information in the event of an accident or failure. This section discusses the Commission's recommendations for advancing well-containment capabilities in the wake of the Macondo well blowout.

1. The Need for Government to Develop Greater Source-Control Expertise

As described in Chapter 5, at the time of the Macondo well blowout on April 20, the U.S. government was unprepared to oversee a deepwater source-control effort. Though the public expected federal authorities to take charge once the accident occurred, neither MMS nor the Coast Guard had the expertise or resources to supervise BP's well-containment efforts. Once the Secretary of Energy's science team, the U.S. Geological Survey, the national laboratories, and other sources of scientific expertise became involved, the government was able to substantively supervise BP's decision-making, forcing the company to fully consider contingencies and justify its chosen path. The government's oversight effort was assisted by outside industry experts, although their involvement also raised some concerns (about conflicts of interest, sharing of proprietary information, and potential liability for participants) that were never resolved.

Recommendation

D1: The National Response Team should develop and maintain expertise within the Federal government to oversee source-control efforts.

The National Response Team should create an interagency group—including representation from the Department of the Interior, Coast Guard, and the Department of Energy and its national laboratories—to develop and maintain expertise in source control, potentially through public-private partnerships. The proposed Ocean Energy Safety Institute at the Department of the Interior could play a role in developing such expertise.

In addition, EPA should amend the National Contingency Plan to:

- Define and institutionalize the role of federal agencies and the national laboratories that possess relevant scientific expertise in source-control.

Create a mechanism for involving outside industry experts in source-control design and oversight.

2. The Need to Strengthen Industry's Spill Preparedness

Beyond attempting to close the blowout preventer stack, no proven options for rapid source control in deepwater existed when the blowout occurred. BP's Initial Exploration Plan for the area that included the Macondo prospect identified only one response option by name: a relief well, which would take months to drill. Although BP was able to develop new source-control technologies in a compressed timeframe, the containment effort would have benefited from prior preparation and contingency planning.

Recommendation

D2: The Department of the Interior should require offshore operators to provide detailed plans for source control as part of their oil spill response plans and applications for permits to drill.

Consistent with the enhanced planning process described above in Recommendation C1, oil spill response plans should be required to include detailed plans for source control. These plans should demonstrate that an operator's containment technology is immediately deployable and effective. (BOEMRE has recently issued a Notice to Lessees requiring operators to demonstrate, as part of the spill response planning process, that they have "access to and can deploy surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control."[20] In enforcing this Notice, BOEMRE must ensure that operators provide detailed descriptions of their technology and demonstrate that it is deployable and effective.)

In applications for permits to drill, the Department of the Interior should require operators to provide a specific source-control analysis for each well. The analysis must demonstrate that an operator's containment technology is compatible with the well. (The Department of the Interior could implement this requirement through amendments to existing regulations[21] or through a Notice to Lessees.[22] The latter option could be implemented more quickly, though the former might be more permanent.)

As with oil spill response plans, source-control plans should be reviewed and approved by agencies with relevant expertise, including the Department of the Interior and the Coast Guard.

3. The Need for Improved Capability to Develop Accurate Flow Rate Estimates

As described in Chapter 5, early flow rate estimates were highly variable and difficult to determine accurately. However, the understated estimates of the amount of oil spilling from the Macondo well appear to have impeded planning for and analysis of source-control efforts like the cofferdam and especially the top kill. U.S. Geological Survey Director Marcia McNutt stated that if a similar blowout occurs in the future, the government will be able to quickly and reliably estimate oil flow using the oceanographic techniques that eventually provided an accurate estimate of the flow rate from the Macondo well.[23]

Recommendation

D3: The National Response Team should develop and maintain expertise within the federal government to obtain accurate estimates of flow rate or spill volume early in a source-control effort.

The National Response Team should create an interagency group—including representation from the Department of the Interior, the Coast Guard, the national laboratories, and NOAA—to develop and maintain expertise in estimating flow rates and spill volumes, potentially through consultation with outside scientists.

In addition, EPA should amend the National Contingency Plan to create a protocol for the government to obtain accurate estimates of flow rate or spill volume from the outset of a spill. This protocol should require the responsible party to provide the government with all data necessary to estimate flow rate or spill volume.

4. The Need for a More Robust Well Design and Approval Process

Among the problems that complicated the Macondo well-containment effort was a lack of reliable diagnostic tools. The *Deepwater Horizon* blowout preventer had one pressure gauge accurate to plus or minus 400 pounds per square inch. This meant BP and the government could not get accurate pressure readings, which in turn hampered their ability to estimate the oil flow rate, undertake reservoir modeling, and plan for source control operations. In addition, the blowout preventer lacked a means of indicating whether and to what extent its rams and annular preventers had closed. Without such instruments, the government and BP expended significant resources on basic data-collection such as obtaining gamma-ray images of the blowout preventer and adding pressure sensors to the top hat after it was deployed. Meanwhile, the presence of rupture disks in the Macondo well's 16-inch casing led to concerns about well integrity that further complicated the source-control effort. BP had not considered the impact of these disks on post-blowout containment when it designed the well.[24]

Recommendation

D4: The Department of the Interior should require offshore operators seeking its approval of proposed well design to demonstrate that:

- Well components, including blowout preventer stacks, are equipped with sensors or other tools to obtain accurate diagnostic information—for example, regarding pressures and the position of blowout preventer rams.

- Wells are designed to mitigate risks to well integrity during post-blowout containment efforts.

E. Overcoming the Impacts of the *Deepwater Horizon* Spill and Restoring the Gulf

As described in Chapters 6 and 7, even before the Macondo well was finally capped and oil stopped flowing, major efforts were underway to mitigate and begin to repair the environmental and economic harm caused by the spill. Those efforts are continuing—and likely will for years. Nevertheless, any effort to draw lessons learned from the *Deepwater Horizon* spill for the purpose of developing options (as the Commission's charter states) to "guard against, and mitigate the impact of, any oil spills associated with offshore drilling in the future" would necessarily be incomplete without an early appraisal of progress toward longer-term restoration in the Gulf. This section describes the actions and initiatives that have been launched to assess and overcome the impacts of the spill, and presents the Commission's recommendations for steps that should be taken to ensure the following three goals are met:

- The environment and the economy of the Gulf region recovers as completely and as quickly as possible, not only from the direct impacts of the spill, but from the decades of degradation that preceded it;
- The people of the Gulf are fairly compensated for the direct and indirect impacts of the spill; and
- Lessons learned from restoration efforts in the Gulf—including advances in scientific understanding, data collection, mitigation technologies and techniques, planning, and institutional coordination—result in enhanced capacity to remedy the impacts of future offshore oil spills and better manage the myriad economic, environmental, and social interests that must be balanced in the Gulf and other critical offshore areas.

1. The Need for Improved Understanding of Oil Spill Impacts, Particularly in the Deepwater Environment

A sophisticated understanding of the full range of impacts from a large-scale oil spill is critical to effective recovery and restoration efforts. Because, however, the concentration and toxicity of oil dissipate rapidly within the first few days to weeks of exposure to the elements, the window of opportunity to collect data in the aftermath of an accident is

narrow. For this reason, advance planning and rapid response mechanisms, are essential to capitalize on research opportunities.

Independent scientists, many of who are long-time scholars of the Gulf ecosystem or have unique capabilities, were eager to study the spill and contribute to the injury assessment. However, the independent science community's ability to participate early on was hampered by a lack of timely access to the response zone. This had the effect of diminishing what was learned from the spill.

Recommendation

E1: The Coast Guard, through the Federal On-Scene Coordinator, should provide scientists with timely access to the response zone so that they can conduct independent scientific research during an oil spill response and long-term monitoring in the future.

The National Science Foundation, in consultation with the new National Ocean Council, should expand on its RAPID grant program to create a framework under which independent science during a spill can be coordinated, with an emphasis on data-sharing, communication, and timely access within the response zone. By ensuring that independent scientists can receive expedited funding after an oil spill, government will gain a more complete understanding of spill-related environmental impacts. A demonstrated commitment to independent science will also serve to bolster public confidence and trust. The rush to study the impacts of the *Deepwater Horizon* spill put a strain on existing scientific resources in the Gulf. Independent, industry, and government scientists all wrangled for funding, equipment and vessels, often duplicating efforts in the process. A program that effectively coordinates research initiatives and resources will provide a significant added value to the scientific community under exigent conditions.

2. The Need for Fair, Transparent Compensatory Restoration Based on Natural Resource Damage Assessments

As described in Chapter 6, the *Deepwater Horizon* spill caused substantial damage to natural resources and habitats across the Gulf coast and in the deepwater offshore environment. Damages to natural resources are formally assessed subject to regulations established under the Natural Resource Damage Assessment provisions of the Oil Pollution Act. The Act requires that the public be compensated for injury to and lost use of public resources. The regulation provides that compensation should be "in-place" and "in-kind" wherever possible, thereby favoring restoration measures with a connection to oil spill impacts. The *Deepwater Horizon* spill is unprecedented in that five Gulf States were affected, each with its own restoration agenda, even though most of the damage occurred in Louisiana. The damage offshore is unprecedented and unknown. The Trustees* responsible for the damage assessment are under pressure to approve projects with an "equitable" (i.e., each state

* The Natural Resource Damage Assessment regulation provides for the designation of affected state, federal, and tribal Trustees to conduct the damage assessment of natural resources, achieve agreement on restoration goals, and design and implement restoration projects to meet those goals. In this case, the Trustees comprise designated federal and state officials who are encouraged to work together and achieve consensus on restoration goals and projects though a Trustee Council. While the regulation supports cooperation, it does not explicitly require consensus by the Trustees. If certain Trustees disagree with the direction of the Natural Resource Damage Assessment process, they are free to break away from the Council and seek reimbursement for natural resource damages on their own.

receives an equal portion) allocation of resources that may not be entirely consonant with the "in-place, in-kind" requirement.

Another challenge for the Trustees is assessing and providing compensatory restoration for the potentially significant marine and deepwater impacts associated with this spill. Historically, most applications of the Natural Resource Damage Assessment process have focused on coastal restoration, but the Macondo well, which spilled oil 5,000 feet below the surface, may have damaged organisms in the water column or on the sea floor for which there should be compensation as well.

Recommendation

E2: The Trustees for Natural Resources should ensure that compensatory restoration under the Natural Resource Damage Assessment process is transparent and appropriate.

Restoration decisions must be transparent, appropriate, and apolitical. The Trustees should appoint an independent scientific auditor to ensure that projects are authorized on the basis of their ability to mitigate actual damages caused by the spill, with special care taken to assess and compensate poorly understood marine impacts. Further, any potential settlement agreement between the responsible party and the Trustees should provide for long-term monitoring of affected resources for a period of at least three to five years, as well as "enhancement"* beyond the baseline. By hewing closely to the "in-place" and "in-kind" principles that underpin Natural Resource Damage Assessment regulations, Trustees will help ensure that injured public resources, and the communities that rely on them, are made whole to the fullest extent possible, regardless of state and federal boundaries. A focus on ocean impacts will provide an invaluable opportunity—missed during the Ixtoc spill of 1979—to assess and remediate damage to marine ecosystems after an oil spill.

3. The Need to Address Human Health Impacts, Especially Among Response Workers and in Affected Communities

As described in Chapter 6, the National Contingency Plan overlooks the need to respond to widespread concerns about human health impacts. For smaller oil spills, the response effort is generally carried out by trained oil spill response technicians, but given the scale of the response to the *Deepwater Horizon* spill and the need to enlist thousands of previously untrained individuals to clean the waters and coastline, many response workers were not screened for pre-existing conditions. This lack of basic medical information, which could have been collected if a short medical questionnaire had been distributed, limits the ability to draw accurate conclusions regarding long-term physical health impacts. Additionally, residents of coastal communities may believe that they suffered adverse health consequences resulting from both chemical exposure from the spill itself and the mental stress occasioned by the spill's assault on their livelihoods.

* "Enhancement" is a term coined during settlement negotiations after the *Exxon Valdez* oil spill of 1989. It requires the responsible party to fund restoration beyond that needed merely to return injured resources to baseline conditions. Rather, any funding should be sufficient to ensure that restoration leaves the affected system better off than before a spill.

Adequate funding and resources were not in place to deal with claims of physical and mental illness among Gulf coast residents resulting from, or exacerbated by, the spill, response actions, and the resulting impacts. Whether allegations that the spill created health problems for responders and Gulf Coast residents are warranted does not change the perception among some that government has not been responsive to health concerns.

The National Contingency Plan contains no specific guidance for responding to public health impacts of an oil spill or hazardous substances release. By contrast, the National Response Framework—which provides the structure for a national response to terrorist attacks, major disasters, and other kinds of emergencies—incorporates a protocol for responding to public health exigencies.

Recommendation

E3: EPA should develop distinct plans and procedures to address human health impacts during a Spill of National Significance.

EPA should amend the National Contingency Plan to add distinct procedures to address human health impacts during a Spill of National Significance. Spills of this magnitude necessarily require a significant clean-up effort, potentially exposing workers to toxic compounds in oil and dispersants. Additionally, residents of coastal communities may suffer adverse health consequences due to both chemical exposure from the spill itself, and the mental stress occasioned by the assault on their livelihoods or way of life. With respect to worker health and safety, existing authorities[25] should be strengthened to ensure consistent application of medical screening and surveillance procedures for both formal response contractors and ad hoc citizen responders. Regarding public health, a medical services protocol similar to the Public Health and Medical Services Annex of the National Response Framework should be incorporated to ensure emergency medical care, timely dissemination of public health information,[26] and medical monitoring and surveillance.[27]

Furthermore, a public health protocol requiring the collection of adequate baseline data and long-term monitoring would allow researchers to assess the human dimensions of oil spills with greater accuracy. Without sound data on the causal or correlative relationships between chemical (i.e., oil and dispersants) exposure and human health, a number of response methods may be used inappropriately—including the provision of appropriate protective gear for cleanup workers.[28]

4. The Need to Restore Consumer Confidence

As described in Chapter 6, images of spewing oil and oiled beaches in newspapers and on television set the stage for public concern regarding the safety of Gulf seafood. Additional factors contributed to the lingering impression that the public could not trust government assurances that the seafood was safe: the unprecedented volumes of dispersants used, confusion over the flow rate and fate of the oil, frustration about the government's relationship with BP in spill cleanup, and lawsuits filed by fishermen contesting the government's assurance of seafood safety. The economic blow to the Gulf region associated with this loss of consumer confidence is sizable. BP gave Louisiana and Florida $68 million

for seafood testing and marketing, as well as money to assess impacts on tourism and fund promotional activities. As of early December, BP was considering a similar request from Alabama.

In future spills, however, there is no guarantee that a responsible party will have the means or the inclination to compensate such losses. Such indirect financial harms are currently not compensable under the Oil Pollution Act. Nevertheless, losses in consumer confidence are real and Congress, federal agencies, and responsible parties should consider ways to restore consumer confidence in the aftermath of a Spill of National Significance.

Recommendation

E4: Congress, federal agencies, and responsible parties should take steps to restore consumer confidence in the aftermath of a Spill of National Significance.

5. The Need for a Long-Term Restoration Effort that Is Well Funded, Scientifically Grounded, and Responsive to Regional Needs and Public Input

As described in Chapter 7, a lack of sustained and predictable funding, together with failed project coordination and long-term planning, have resulted in incomplete and often ineffective efforts to restore the Gulf's natural environment. Currently, no funding source exists to support regional restoration efforts. Estimates of the cost of Gulf restoration vary widely, but according to testimony before the Commission, fully restoring the Gulf will require $15 billion–$20 billion, or a minimum of $500 million per year, over 30 years. While a number of different sources currently provide funding to individual states for restoration, none of these sources provides funds for Gulf-wide coastal and marine restoration and none is sufficient to support the sustained effort required. Most policymakers agree that without a reliable source of long-term funding, it will be impossible to achieve restoration in the Gulf.

Several Gulf States and the federal government have filed or are expected to file suit against BP and other companies involved in the spill, which will likely create opportunities to direct new restoration funds to the region. In some cases, congressional action will be required to ensure that funds are directed to this purpose. Meanwhile, Congress has already begun considering other potential funding sources, including a higher per-barrel tax on oil production, increased royalties or fees, and direct appropriations for Gulf-wide restoration through the normal federal budget process. Although many of these proposals face political hurdles, the fact remains that resources are needed if progress on coastal restoration is to continue. Inaction is a prescription for further degradation: since many Gulf ecosystems were already fragile and deteriorating before the spill, maintaining the status quo amounts to accepting their continued decline, with the longer-term risks and vulnerabilities this entails.

In order for funding to be most efficiently directed at long-term restoration, a decision-making body is needed that has authority to set binding priorities and criteria for project funding. The Gulf Coast Ecosystem Restoration Task Force is now in place; it was recommended by a September 2010 report on restoration from Secretary of the Navy Ray

Mabus to the President and subsequently established by Presidential Executive Order.[29] According to the language of the Executive Order, the job of the Task Force is to begin coordinating the different restoration projects being undertaken by various jurisdictions in the Gulf, coordinating related science activities, and engaging stakeholders. However, as many in Congress and the Administration have suggested, the Task Force lacks some features necessary to effectively direct long-term restoration efforts in the Gulf—most importantly the ability to set binding goals and priorities. A number of critical issues remain to be addressed, including how to allocate funding in a way that addresses the relative restoration needs of individual states; how to balance the roles and interests of the state and federal governments; how to ensure that decisions are made efficiently and quickly; how to incorporate good science without unduly slowing valuable projects; and how to incorporate meaningful public input.

Recommendations

E5: Congress should dedicate 80 percent of the Clean Water Act penalties to long-term restoration of the Gulf of Mexico.

E6: Congress and federal and state agencies should build the organizational, financial, scientific, and public outreach capacities needed to put the restoration effort on a strong footing.

The Commission's recommendations share much common ground with those outlined in Secretary Mabus's report this past September. For instance, the Commission recommends that Congress—recognizing that dedicated, sustained funding is necessary to accomplish long-term Gulf of Mexico ecosystem restoration—should direct 80 percent of Clean Water Act penalties to support implementation of a region-wide restoration strategy. Directing such payments to the Gulf could, for the next 10 years, provide significant funding. If litigation arising from the spill results in civil or criminal penalties, a global settlement of litigation should include supplemental environmental projects* and community service projects that direct payments to the Gulf. Should Clean Water Act penalties not be redirected toward Gulf ecosystem restoration, Congress should consider other mechanisms for a dedicated funding stream not subject to annual appropriations.

The Commission recommends that Congress establish a joint state-federal Gulf Coast Ecosystem Restoration Council. The structure of the *Exxon Valdez* Oil Spill Trustee Council should inform the structure of the Gulf Coast Council on the question of the relative representation of the federal and state governments on the council. The Gulf Coast Council should implement a restoration strategy for the region that is compatible with existing state restoration goals. This strategy should set short- and long-term goals with criteria for selecting projects for funding. Key criteria should include (1) national significance; (2) contribution to achieving ecosystem resilience; and (3) the extent to which national policies such as related to flood control, oil and gas development, agriculture, and navigation directly contributed to the environmental problem.

* "Supplemental environmental projects" are projects that a defendant agrees to undertake as part of a settlement with government of an enforcement action and that are above and beyond those necessary to comply with applicable legal requirements.

Experience in major restoration endeavors, including those in the Gulf, has shown that, absent binding goals to drive the process, restoration projects are insufficiently funded, focused, or coordinated. Establishing a region-wide council to coordinate agency activities represents a necessary first step, but without authority to set priorities and resolve conflicts, such a council will be hampered in its ability to achieve environmental goals. The Commission recommends that a region-wide council for the Gulf be given authority to set priorities that will govern the expenditure of funds and resolve any conflicts regarding eligibility of projects. The council should further define specific categories of projects that could meet each of the three criteria listed above. Projects could be categorized in a number of ways—for example, by habitat (key estuaries, sea grass, wetlands, coral reefs); by goal (biological productivity and ecosystem function, improving resilience, restoring fisheries); or by specific project type (river diversion, beach nourishment).

The Commission believes that having a comprehensive, binding strategy to guide the restoration effort is critical to success. By elaborating on the goals set by the governing entity and by providing specific milestones and restoration objectives, such a strategy would focus the overall effort and help ensure that projects are not duplicative. The strategy could also include a map that ties projects to specific places and provide a useful mechanism for public involvement. Congress should also ensure that the priorities and decisions of the Gulf Coast Council are informed by input from a Citizens Advisory Council that represents diverse stakeholders.

Finally, but essentially, restoration decisions must be rooted in science. An approach that draws heavily on information and advice from scientists will result in project selection and funding allocations that are more likely to lead to an effective region-wide restoration strategy. It will also advance transparency in decision-making and enhance credibility with the public. The Commission accordingly recommends the establishment of a Gulf Coast Ecosystem Restoration Science and Technology Program that would address these issues in three ways: 1) by creating a scientific research and analysis program, supported by the restoration fund, that is designed to support the design of scientifically sound restoration projects; 2) by creating a science panel to evaluate individual projects for technical effectiveness and consistency with the comprehensive strategy; and 3) by supporting adaptive management plans based on monitoring of outcomes scaled both to the strategy itself and to the individual projects or categories of projects included in it.

6. The Need for Better Tools to Balance Economic and Environmental Interests in the Gulf

Federal agencies charged with managing activities within the U.S. Exclusive Economic Zone have tended to work largely in isolation from one another. Responsive to the recommendations of the 2004 U.S. Commission on Ocean Policy, President Obama in June 2009 directed two dozen federal departments and agencies to provide in-depth recommendations about how federal policy can address inefficiencies in the nation's traditionally ad hoc management of its seas. The Interagency Ocean Policy Task Force reported in the summer of 2010; its recommendations were subsequently included in a Presidential Executive Order, issued on July 15, 2010, that created a new National Ocean Council to coordinate federal marine policy.

Prominent recommendations included a requirement that key regional and federal authorities develop and implement coastal and marine spatial planning, for ocean users and the public. This system is designed to optimize marine productivity. More broadly, scientific advice grounded in peer-reviewed empirical research inform strategy and decision-making in ocean management, including for energy, shipping, national defense, sustainable fisheries, and conservation.

Recommendation

E7: The appropriate federal agencies, including EPA, Interior, and NOAA, and the Trustees for Natural Resources should better balance the myriad economic and environmental interests concentrated in the Gulf region going forward. This would include improved monitoring and increased use of sophisticated tools like coastal and marine spatial planning. Many of these tools and capacities will also be important to manage areas of the OCS outside the Gulf.

The Commission recommends that as a part of management and restoration efforts in the marine environment greater attention should be given to new tools for managing ocean resources, including monitoring systems and spatial planning. Marine scientists have emerged from the *Deepwater Horizon* incident with more precise questions to investigate and a better sense of monitoring needs in the Gulf of Mexico, which because of its multiple uses and economic value should be a national priority. To that end, the National Ocean Council should work with the responsible federal agencies, industry and the scientific community to expand the Gulf of Mexico Integrated Ocean Observing System, including the installation and maintenance of an in situ network of instruments deployed on selected production platforms. Participation in this system by industry should be regarded as a reasonable part of doing business in nation's waters.

Coastal and marine spatial planning has the potential to improve overall efficiency and reduce conflicts among ocean users. Congress should fund grants for the development of regional planning bodies at the amount requested by the President in the fiscal year 2011 budget submitted to Congress. Ocean management should also include more strategically sited Marine Protected Areas, including but not limited to National Marine Sanctuaries, which can be used as "mitigation banks" to help offset harm to the marine environment. Given the economic and cultural importance of fishing in the Gulf region—and the importance of Gulf seafood to the rest of the country—scientifically valid measures, such as catch share programs, should be adopted to prevent overfishing and ensure the continuity of robust fisheries.

Marine spatial planning was designed to ensure that myriad ocean management decisions are compatible and consistent, that they make sense. In the decades since marine protection began, scientists have developed a much more robust understanding of the Gulf's physical and ecological processes. Now, for example, Marine Protected Areas can be used—and should be used—to ensure the continuity and robustness of fisheries into the future. Rationalizing ocean use around this much improved scientific understanding—for example, by identifying which parts of the ocean are appropriate (or inappropriate) for certain

uses—should serve to maximize the productivity of natural systems and end inefficient or harmful practices that have accumulated over time.

F. Ensuring Financial Responsibility

As described in Chapter 6, oil spills cause a range of harms, both economic and environmental, to individuals and ecosystems. The Oil Pollution Act makes the party responsible for a spill liable for compensating those who suffered as a result of the spill—through property damage, lost profits, and other economic injuries—and for restoring injured natural resources. The Act also provides an opportunity to make claims for compensation from a dedicated Oil Spill Liability Trust Fund. The Oil Pollution Act, however, imposes limits on both the amount for which the responsible party is liable, and the amount of compensation available through the trust fund. In the case of the *Deepwater Horizon* spill, BP (a responsible party) has placed $20 billion in escrow to compensate private individuals and businesses through the independent Gulf Coast Claims Facility. But if a less well capitalized company had caused the spill, neither a multi-billion dollar compensation fund nor the funds necessary to restore injured resources, would likely have been available.

It is critical that compensation to victims be paid in full, and that the process for receiving compensation is swift and efficient. The Commission offers recommendations that would increase assurances that responsible parties are able to compensate victims (and at the same time strengthens incentives to prevent accidents in the first place), and that the Oil Spill Liability Trust Fund provide any compensation not provided by responsible parties. It also recommends a close review of the Gulf Coast Claims Facility process to determine its effectiveness in adjudicating compensation claims and its value as a model for future Spills of National Significance.

1. The Need to Increase Existing Limitations on Responsible Party Liability

Liability for damages from spills from offshore facilities is capped under the Oil Pollution Act at $75 million, unless it can be shown that the responsible party was guilty of gross negligence or willful misconduct, violated a federal safety regulation, or failed to report the incident or cooperate with removal activities, in which case there is no limit on damages (see Chapter 8). Claims up to $1 billion above the $75 million cap for certain damages can be made to, and paid out of, the Oil Spill Liability Trust Fund, which is currently supported by an 8-cent per-barrel tax on domestic and imported oil.

The Oil Pollution Act also requires responsible parties to "establish and maintain evidence of financial responsibility," generally based on a "worst-case discharge" estimate. In the case of offshore facilities, necessary financial responsibility ranges from $35 million to $150 million. The financial responsibility requirement provides a direct link between the Oil Pollution Act and insurance, as the Act provides that financial responsibility may be "established by any one, or by any combination, of the following methods" if determined by the Secretary of the Interior to be acceptable: "evidence of insurance, surety bond,

guarantee, letter of credit, qualification as a self-insurer, or other evidence of financial responsibility."

There are two main problems with the current liability cap and financial responsibility dollar amounts:

- Lack of Adequate Safety Incentives: A threshold problem with any damages cap that limits liability well below levels that may actually be incurred is that such a cap distorts the incentives of industry participants to adopt cost-effective safety precautions. Decisions regarding safety precautions are made for a variety of reasons, some of which cannot be influenced by policy measures. The relatively modest liability cap and financial responsibility requirements provide little incentive for oil companies to improve safety practices.

- Inadequate Damages Compensation: BP's damages from the *Deepwater Horizon* spill will total in the tens of billions of dollars. The company has already paid claims that measure in the billions, and has waived the statutory $75 million cap. But there is no guarantee that other companies in the future will agree to waive the cap. And if an oil company with more limited financial means than BP had caused the *Deepwater Horizon* spill, that company might well have declared bankruptcy long before paying fully for all damages. In the case of a large spill, the Oil Spill Liability Trust Fund would likely not provide sufficient backup. Thus, a significant portion of the injuries caused to individuals and natural resources, as well as government response costs, could go uncompensated.

Any discussion of increasing liability caps and financial responsibility requirements must balance two competing public policy concerns: first, the goal of ensuring that the risk of major spills is minimized, and in the event of a spill, victims are fully compensated; and second, that increased caps and financial responsibility requirements to do not drive competent independent oil companies out of the market. A realistic policy solution also requires an understanding of the host of complex economic impacts that could result from increases to liability caps and financial responsibility requirements.

Recommendation

F1: Congress should significantly increase the liability cap and financial responsibility requirements for offshore facilities.

To address both the incentive and compensation concerns noted above, Congress should significantly raise the liability cap. Financial responsibility limits should also be increased, because if an oil company does not have adequate resources to pay for a spill, the application of increased liability has little effect: Should a company go bankrupt before fully compensating for a spill, its liability is effectively capped. If, however, the level of liability imposed and the level of financial responsibility required are set to levels that bear some relationship to potential damages, firms will have greater incentives to maximize prevention and minimize potential risk of oil spills[30] and also have the financial means to ensure that victims of spills do not go uncompensated.

Legislative attempts to raise the cap and financial responsibility requirements to significantly higher levels have been met with the argument that these changes will cause insurance carriers to drop oil pollution coverage, leading to an exodus of small and independent companies from the offshore drilling market. The counter-argument is that oil companies should bear the social costs of their activities, and if those costs are too large or unpredictable to be insurable, then it is appropriate that these companies exit the market.

There is legitimacy to aspects of both arguments. A company should not be able to cause billions of dollars of damage and walk away, simply because its operations contribute to the economy of the Gulf. Nor should smaller companies that can demonstrate the ability to drill safely and to pay for damages resulting from a large spill be forced out of the market. However, smaller companies that cannot demonstrate financial responsibility and meet risk requirements set and monitored by the Department of the Interior or a third party should not be allowed to make others pay for the costs of their accidents.

One option for keeping competent independents in the market is a mutual insurance pool. Under such an arrangement, individual companies engaged in offshore drilling would pay premiums into a pool, which would pay out damages caused by a company as a result of a spill. A possible downside is that the mutual pool could have the effect of undercutting incentives individual firms might otherwise have to improve safety practices—but this problem could be addressed, for example, by tying premium levels to the financial and safety risk posed by an individual company's activities. This option would allow companies to demonstrate financial responsibility for the cost of spills, at least to the limit paid out by the pool.

Another option would be to phase in increases in the liability cap and financial responsibility requirements, which would allow the insurance industry a period of adjustment. Although any increase in liability limits and financial responsibility requirements would test the capacity of the offshore drilling insurance market, over time such a change would almost certainly stimulate an increase in insurance capacity. A phased-in approach would allow Congress to re-assess any concerns about limited capacity in the insurance industry in light of actual experience.

Finally, regardless of how insurance is provided, smaller firms could be encouraged to partner with firms with greater financial resources. It should be noted that "joint ventures" between larger and smaller companies already exist; thus a policy change may not be necessary to encourage such arrangements.

2. The Need to Increase Limitations on Payments from the Oil Spill Liability Trust Fund

If liability and financial responsibility limits are not set at a level that will ensure payment of all damages for spills, then another source of funding will be required to ensure full compensation. The federal government could cover additional compensation costs, but

this approach requires the taxpayer to foot the bill. Therefore, Congress should raise the Oil Spill Liability Trust Fund per-incident limit because the current limits are clearly inadequate.

Recommendation

F2: Congress should increase the limit on per-incident payouts from the Oil Spill Liability Trust Fund.

Raising the Oil Spill Liability Trust Fund's per-incident limit will require the Fund to grow through an increase of the per-barrel tax on domestic and imported oil production. An alternative would be to increase the Trust Fund through a surcharge by mandatory provisions in drilling leases triggered in the event that there are inadequate sums available in the Fund. An increase in the Oil Spill Liability Trust Fund's per-incident limit would not provide an incentive to offshore facilities to mitigate risks, because risks are pooled and the Oil Spill Liability Trust Fund is funded by parties other than those who engage in offshore drilling activities. But raising the limit would help ensure that victims have access to compensation without the need to seek further specific funding from Congress, or otherwise burdening the taxpayer.

3. The Need for Better Auditing and Monitoring of Risk

The Interior Department currently determines financial responsibility levels based on potential worst-case discharges, as required by the Oil Pollution Act. Although the agency's analysis to some degree accounts for the risk associated with individual drilling activities, it does not fully account for the range of factors that could affect the cost of a spill, and thus the level of financial responsibility that should be required. Interior should analyze a host of specific, risk-related criteria when determining financial responsibility limits applicable to a particular company, including, but not limited to: geological and environmental considerations, the applicant's experience and expertise, and applicable risk management plans. This increased scrutiny would provide an additional guard against unqualified companies entering the offshore drilling market.

Recommendation

F3: The Department of the Interior should enhance auditing and evaluation of the risk of offshore drilling activities by individual participants (operator, driller, other service companies). The Department of the Interior, insurance underwriters, or other independent entities should evaluate and monitor the risk of offshore drilling activities to promote enhanced risk management in offshore operations and to discourage unqualified companies from remaining in the market.

If liability and financial responsibility limits are raised, increased liabilities will be borne by insurance carriers, which will have a strong incentive to promote new safety techniques and methods, as well as to monitor risk. Insurance carriers might insist on certification of operators by an independent entity devoted to identifying best safety practices and monitoring risk, such as a self-policing safety organization for the oil and gas industry, as

recommended in Chapter 8. Insurers or a self-policing safety organization for the industry also could provide a guard against unqualified companies entering the offshore drilling market.

4. The Need for Assessment of the Existing Claims Process

The Oil Pollution Act holds the responsible party liable for private claims brought by individuals or businesses for removal costs and certain damages. All claims must first be presented to the responsible party, but if the responsible party denies a claim, the claimant may pursue an in-court action or present an uncompensated claim for payment to the Oil Spill Liability Trust Fund. The Gulf Coast Claims Facility (Claims Facility), which is independently administered on behalf of BP (the responsible party), has established a claims processing mechanism that attempts to resolve claims against the responsible party outside of the courts.[31] Kenneth Feinberg, formerly Special Master for the September 11th Victim Compensation Fund, administers the $20 billion escrow account through the Claims Facility. Eligible claims include: (1) removal and clean-up costs; (2) physical damages to real or personal property; (3) lost profits or impairment of earning capacity; (4) loss of subsistence use of natural resources; and (5) physical injury or death. The Facility does not pay claims brought by the government, or related to real estate, the moratorium, or the Vessel of Opportunity program.[32]

To date, some claimants have been dissatisfied with decisions to deny certain claims and with the amount and timeliness of compensation received from approved claims, which has required Feinberg to reconsider the rules and processes in place for reimbursement. The United States Department of Justice sent a letter to Feinberg on September 17, 2010, urging expediency.[33] In response, the Claims Facility noted that the large number of fraudulent and undocumented claims have slowed the process.[34] Nonetheless, after the September 17 letter, Feinberg made several adjustments to the program including streamlining processing time and removing geographic proximity to the oil spill as bar against payment, Feinberg also extended the timeframe within which claimants could receive interim payments without waiving their right to pursue litigation.[35] As of December 11, 2010, the Claims Facility has paid more than $2.4 billion in claims to more than 164,000 claimants.[36] The Commission believes it would be useful to evaluate the effectiveness of the Claims Facility as a means of informing the compensation process in future large spills.

Recommendation

F4: The Department of Justice's Office of Dispute Resolution should conduct an evaluation of the Gulf Coast Claims Facility once all claims have been paid out, in order to inform claims processes in future Spills of National Significance. The evaluation should include a review of the process, the guidelines used for compensation, and the success rate for avoiding law suits.

G. Promoting Congressional Engagement to Ensure Responsible Offshore Drilling

The Commission's recommendations in this report include some directed to Congress for specific legislation, and others directed to various specific federal agencies, responsible parties, and the oil and gas industry in general. The several recommendations directed to Congress, however, also highlight a further lesson: the need for Congress to engage more systematically in ensuring the safety of drilling in the OCS and environmental protection. This includes more active congressional oversight, and also includes congressional action to ensure that those in government responsible for safety oversight and environmental protection review have the resources necessary to do their jobs. To that end, this final set of recommendations addresses the need for Congress itself to take affirmative steps to ensure responsible offshore drilling.

1. The Need for Congressional Awareness and Engagement

In the years between the *Exxon Valdez* spill and the spring of 2010, Congress, like much of the nation, appears to have developed a false sense of security about the risks of offshore oil and gas development. Congress showed its support for offshore drilling in a number of ways, but did not take any steps to mitigate the increased perils that accompany drilling in ever-deeper water. Until the *Deepwater Horizon* exploded, 11 rig workers lost their lives, and millions of barrels of oil spilled into the Gulf of Mexico, Congress had not introduced legislation to address the risks of deepwater drilling.

The congressional committee structure makes it much harder to focus on safety and environmental issues associated with offshore oil and gas development. In the 111th Congress, multiple committees in both chambers claimed jurisdiction over offshore energy development. The House Natural Resources Committee, for example, had jurisdiction over "mineral land laws and claims and entries there under" and "mineral resources of public lands." Its Subcommittee on Energy and Mineral Resources was specifically charged with oversight of "conservation and development of oil and gas resources of the Outer Continental Shelf." But the House Committee on Energy and Commerce oversaw "exploration, production, storage, supply, marketing, pricing, and regulation of energy resources, including all fossil fuels," as well "national energy policy generally." Similarly, the jurisdiction of the Senate Committee on Energy and Natural Resources included "extraction of minerals from oceans and Outer Continental Shelf lands," and its Subcommittee on Energy was responsible for oversight of "oil and natural gas regulation" generally. By contrast, the Senate Committee on Environment and Public Works claimed oversight over "environmental aspects of Outer Continental Shelf lands." Yet, during the 110th and 111th Congresses, none of the subcommittees of environment and public works claimed oversight specifically over OCS lands issues.

In neither the House nor the Senate are any of these committees charged with directly overseeing the safety and environmental impacts of offshore development, separate from the conflicting goal of resource development and royalties. The House Committee on

Education and Labor and the Senate Committee on Health, Education, Labor, and Pensions both emphasize occupational safety and health. But neither committee appears to focus on process safety—the vital approach identified by this Commission's investigation that encompasses procedures for minimizing adverse events such as effective hazard analysis, management of risk, communication, and auditing. Finally, no oversight of any of these matters has been conducted by any of the several House or Senate committees or subcommittees responsible for the nation's tax policies or overall appropriations process, notwithstanding the significant impact those policies and appropriations have on both the extent of energy industry activities on the OCS and the government's ability to oversee that activity effectively.

After the *Deepwater Horizon* explosion and resulting oil spill, numerous committees took an interest in offshore safety and environmental issues and held hearings. In short, it took a catastrophe to attract congressional attention.

Recommendation

G1: Increase and maintain congressional awareness of the risks of offshore drilling in two ways. First, create additional congressional oversight of offshore safety and environmental risks. Second, require the appropriate congressional committees to hold an annual oversight hearing on the state of technology, application of process safety, and environmental protection to ensure these issues receive continuing congressional attention.

- The House and Senate Rules Committee should each assign a specific committee or subcommittee to oversee process safety and environmental issues related to offshore energy development. These committees should also be given the task of overseeing the Offshore Safety Authority, the creation of which this Commission has separately recommended.

- Congress should require the Secretary of the Interior to submit an annual public report on energy offshore development activities to the applicable congressional committees. This report should focus on the Department's progress in improving its prescriptive safety regulations; steps taken by industry and the Department to improve facility management; the Department's progress in implementing a stronger environmental assessment program, including developing improved NEPA guidelines; and on any other steps taken by industry or the Department to address safety and environmental concerns offshore. The report should also detail the industry's safety and environmental record during the previous 12 months. Finally, the report should highlight any areas in which the Department believes industry is not doing all that it can to promote safety and the environment and any areas where additional legislation could be helpful to the Department's efforts.

- Congress should require the Department of the Interior's Office of Inspector General to submit an independent annual public report to the applicable congressional committees. The report should provide an independent description of the Offshore

Safety Authority's activities over the previous 12 months, including its efforts to improve offshore safety and to investigate accidents and other significant offshore incidents. The report should also include the Inspector General's evaluation of the Authority's efforts and the Inspector General's recommendations for improvement.

2. The Need for Adequate Funding for Safety Oversight and Environmental Review

Many of the earlier recommendations require adequate congressional funding in order to be implemented effectively. For instance, the new Offshore Safety Authority at Interior cannot be expected to succeed in meaningfully overseeing the oil and gas industry if Congress does not ensure it has the resources to do so. Agencies cannot conduct the scientific and environmental research necessary to evaluate impacts of offshore development if they do not receive adequate support from Congress. In short, Congress needs to make funding the agencies regulating offshore oil and gas development a priority in order to ensure a safer and more environmentally responsible industry in the future.

BOEMRE currently receives a portion of its funding from offsetting collections from industry. In its Fiscal Year 2011 Budget Justification, it requested that just less than half of its budget—$174.9 million—come from these collections.[37] The oil and gas industry, however, should do significantly more and provide the funds necessary for regulation of offshore oil and gas operations and oil spill preparedness planning. The amount of funding needs to keep pace as industry moves into ever-more challenging depths and geologic formations because the related challenges of regulatory oversight likewise increase. This could be accomplished many different ways. Congress could, for instance, raise the inspection fees already imposed on facilities operating on the OCS—currently offsetting about three percent of BOEMRE's annual budget—or impose a differently based annual regulatory fee on new and existing leases. Or Congress could instruct the Department of the Interior to include lease provisions that require the imposition of regulatory fees. Interior already possesses broad authority to include in leases "such rental and other provisions as the Secretary may prescribe at the time of offering the area for lease."[38] No matter the precise mechanism, the oil and gas industry would be required to pay for its regulators, just as fees on the telecommunications industry support the Federal Communications Commission. Regulation of the oil and gas industry would no longer be funded by taxpayers but instead by the industry that is being permitted to have access to a publicly-owned resource. Future Congresses would therefore have less incentive to reduce agency funding.

Recommendation

G2: Congress should enact legislation creating a mechanism for offshore oil and gas operators to provide ongoing and regular funding of the agencies regulating offshore oil and gas development.

The President asked this Commission to recommend not only "improvements to Federal laws, regulations, and industry practices applicable to offshore drilling," but also "organizational or other reforms of Federal agencies or processes necessary to ensure such improvements are implemented and maintained." In carrying out this charge, the Commission has been mindful of the dangers of "fighting the last war": that is, addressing the specific failures revealed by the *Deepwater Horizon* disaster, but neglecting to anticipate future problems whose contours are yet unknown. Our recommendations—for a new approach to risk assessment and management; a new, independent agency responsible for safety and environmental review of offshore drilling; stronger environmental review and enforcement; a reorientation of spill response and containment planning; and a revision of liability rules to better protect victims and provide proper incentives to industry—aim to establish an oversight regime that is sufficiently strong, expert, well-resourced, and flexible to prevent the next disaster, not the last. The oil and gas industry—remarkable for its technological innovation and productivity—needs government oversight and regulation that can keep pace.

Chapter Ten
American Energy Policy and the Future of Offshore Drilling

Introduction

The BP *Deepwater Horizon* disaster undermined public faith in the oil and gas industry, in government regulators, and even in America's ability to respond to crises. The disaster raised serious questions about our nation's ability to manage and protect for current and future generations the invaluable natural resources of the outer continental shelf and the multiple uses they sustain—the patrimony of all Americans. Based on the Commission's thorough and vigorous accounting of this tragedy, the central lesson to be drawn from the catastrophe is that no less than an overhauling of both current industry practices and government oversight is now required. The changes necessary will be transformative in their depth and breadth, requiring an unbending commitment to safety by government and industry to displace a culture of complacency. Drilling in deepwater does not have to be abandoned. It can be done safely. That is one of the central messages of this report. The reforms proposed herein are intended to do for this industry what new policies and practices have done for other high-risk industries after their disasters.

It was clear sailing for a fleet of oil rigs off Louisiana in April 2009. The *Deepwater Horizon* disaster a year later was a tragic wake-up call. Moving forward, offshore drilling in the Gulf of Mexico or in new U.S. frontiers will require, in the words of the report, "unbending commitment to safety by government and industry."

< Benjamin Lowy/VII Network/Associated Press

The potential for such a transformation to ensure productive, safe, and responsible offshore drilling is significant, and provides reason for optimism even in the wake of a disaster.

The significance of the *Deepwater Horizon* disaster, however, is broader than just its relevance to the future of offshore drilling. The disaster signals the need to consider the broader context of the nation's patterns of energy production and use, now and in the future—the elements of America's energy policy. The explosion at the Macondo well and the ensuing enormous spill—particularly jarring events because of the belief they could never happen—force a reexamination of many widely held assumptions about how to reconcile the risks and benefits of offshore drilling, and a candid reassessment of the nation's policies for the development of a valuable resource. They also support a broader reexamination of the nation's overall energy policy.

Offshore oil and gas will continue to be an important part of the nation's domestic energy supply for many decades. Offshore wells yield one-third of current U.S. oil production,[1] and in recent decades helped offset declines in production elsewhere in the United States (U.S. production peaked in 1970).[2] That already-crucial role is likely to increase. The area of federal jurisdiction, the outer continental shelf, contains an estimated 85 billion barrels of oil in technically recoverable resources[3] —more than all onshore resources and those in the shallower state waters *combined*.[4] The future of domestic oil production will rely to a substantial extent on current outer continental shelf sources and further development of deposits there—in progressively deeper, more distant waters, and perhaps in such challenging environs as the Alaskan Arctic. Whether we explore for and produce oil and gas from those prospective reserves, and if so, under what conditions, depends crucially on taking to heart the lessons we learn from the *Deepwater Horizon* disaster and the energy policies we put in place.

Important decisions about whether, when, where, and how to engage in offshore drilling cannot be made wisely if they are made in a vacuum. Policies about offshore drilling should be powerfully shaped by economic, security, pace of technology, safety, and environmental concerns. Offshore drilling will certainly be an important part of any national energy policy. But it is only a part of the picture, and its relative importance today will not, and should not, be the same a half-century from now. The nation must begin a transition to a cleaner, more energy-efficient future. Nonrenewable oil and gas resources are just that—nonrenewable—which means any nation forging an energy policy for the future must develop the technologies that provide maximum energy efficiency and create renewable substitutes. Otherwise, the nation's security and well-being will be increasingly dependent on diminishing supplies of nonrenewable resources, and even more dependent on supplies from foreign sources.

Domestic consumption of oil has exceeded domestic production since the late 1940s, making the country increasingly dependent on imports, which now supply about 52 percent of U.S. needs compared to 42 percent in 1990. In the near term, oil from federal offshore lands helps moderate America's dependence on imported supplies, lessening the current trade deficit and contributing to national security.

The government also reaps significant revenues from the leasing of federal lands and the collection of royalties on production—typically, billions of dollars per year. The development of offshore energy resources contributes substantially to local economies, supporting businesses small and large and employing tens of thousands of workers. But any sensible energy policy must recognize the substantial risks that accompany these real benefits, in addition to the dangers of an economy and national security dependent on nonrenewable energy supplies. The impressive technologies developed for offshore drilling and production have not been accompanied by comparable improvements in safety and environmental protection. As Americans now know, three major companies failed to apply rigorous process safety measures to their drilling operations in the Gulf of Mexico: Halliburton and Transocean, which service drilling operations throughout the Gulf, along with BP —underscoring the systemic nature of the offshore industry's problems.

This Commission has documented and explained these tragic failures, and in this report has recommended a comprehensive, integrated set of reforms required to improve the performance of the offshore oil and gas industry, as appropriately overseen by an effective regulatory authority. A safe offshore oil and gas industry matters—both because the costs of needlessly risky behavior are so high, and because the nation is so dependent on offshore energy supplies. In light of present knowledge, inaction is a policy of dangerous default—of continuing to rely on chance and luck to avoid a "next time." American citizens will demand and will hold the oil and gas industry and government officials responsible for creating the conditions under which a robust offshore oil and gas industry can operate safely and co-exist with human health, environmental protection, and other economic activities.

Weighing National Security, the Economy, Human Safety, and the Environment

In contemporary America, petroleum is woven into every aspect of our lives. The continuous availability of oil products—gasoline, diesel, and jet fuel—powers the mobility that has become key to a strong economy. Military operations, the movement of food and other commercial products, and personal travel would all grind to a halt without oil—at least as our society is organized today. Yet growing demand for oil around the world, particularly in the huge and rapidly developing economies of Asia, ensures heightened competition for supplies, putting upward pressure on oil prices. That poses a long-term challenge for the United States, which is not and cannot be self-sufficient in oil supply. At the same time, scientific evidence has continued to mount on the interconnections among the use of all carbon-based fuels, including oil and natural gas, the growing concentrations of greenhouse gases, and global climate change.[5] Energy policy thus embraces considerations of national security, the economy, environmental protection, the need to limit climate change, the pace of development of renewable energy sources and nonpetroleum dependent vehicles, human health and safety, and unique regional conditions.

Security and petroleum resources. The major American security risk derives from oil's predominant role in transportation: 72 percent of oil consumed in the United States in 2009 was used for transportation—and 94 percent of transportation relied on oil.[6] As the National Academy of Sciences recently concluded, the nation "needs to lower its

dependence on fragile supply chains for some energy sources, particularly petroleum at present and possibly natural gas in the future, and to avoid the impacts of this dependence on our nation's economy and national security."[7] The good news is that energy-efficient technologies exist today that can in the near term moderate the nation's demand for oil and change the mix of supplies of electricity and energy over time. But changing existing reliance on oil in general and oil imports in particular will require a major overhaul of our energy and transportation systems, a challenging shift that would require strong public leadership, and would take decades to effect even if we agreed on the course of action tomorrow.

Recent events have made clear the magnitude of the stakes. The United States has repeatedly been surprised by sudden interruptions in the oil supply from various unexpected events—underscoring the nation's potential vulnerability. These include politically motivated production cuts by oil-exporting countries (the oil embargo of 1973-1974); border wars between oil exporters (between Iraq and Iran in 1980-1988, and Iraq and Kuwait in 1990-1991); strife and unrest within several oil-exporting countries; and severe weather events affecting offshore oil production or coastal refineries (Hurricanes Katrina and Rita in 2005 and Ike in 2008—all in the Gulf of Mexico). Energy planners also worry about the possibility that the Straits of Hormuz—the only sea passage to the open ocean for the bulk of Persian Gulf petroleum exports—could be closed, or that a major oil pipeline somewhere in the world could be ruptured by accident or attack.

Even absent an actual interruption in supplies, our reliance on foreign oil is a national security concern. Hostile exporting nations can use the threat of interrupting supplies to pressure the United States. Money spent on foreign oil can also end up in the hands of terrorists or be used to build nuclear or develop biological weapons in nations flouting the international atomic and biological regulatory regimes. The ultimate nightmare would be an America depleted of petroleum, which has failed to make a sufficient transition to alternative sources, facing another Pearl Harbor or the aftershocks of 9/11.

Since "Colonel" Drake first struck oil at his Pennsylvania site in 1859, the United States has already extracted over 200 billion barrels of oil from its territory[8]—more than our estimated remaining reserves. The United States did not relinquish its position as the world's leading producer until 1974[9]—but now it finds itself credited with only 1.4 percent of the world's proved oil reserves, while consuming 22 percent of the global supply annually.[10] (The use of advanced extraction technologies and a relatively favorable investment climate have enabled the United States to remain the world's third-largest oil producer, despite its relatively meager reserves.)

Would the country's security interests be better served by developing domestic oil resources as rapidly as possible—or by reserving some for future generations? President Harry Truman argued that federal offshore oil resources should become part of the naval petroleum reserve system, leaving the oil in the ground for later development (see Chapter 3). In recent decades, the concept of the Naval Petroleum Reserve has been superseded by a more readily accessible Strategic Petroleum Reserve, which currently contains more than 700 million barrels of unrefined crude oil stored in Louisiana and Texas salt caverns along

the Gulf coast where it is available for national emergencies (such as sudden disruptions of supply).[11] That provides some insurance—but only about 75 days of supply at the current rate of U.S. imports, and clearly not sufficient to displace any long-term decline in domestic production or respond to a spike in demand. The United States has kept some areas of the outer continental shelf off-limits for oil and gas production: to protect their unique and valuable environmental characteristics, to avoid incurring risks to major industries such as fishing and tourism, or to maintain open waters for testing of military armaments and training exercises over the Gulf. One way of viewing these areas where drilling is prohibited—Atlantic Coast, Eastern Gulf of Mexico and Florida coast and the coasts of Northern California, Oregon, and Washington—is as energy sources held in reserve.

National economic implications. The domestic oil and gas sector is a major employer, particularly in fuel-producing regions. Fluctuations in oil and gas prices generally pass quickly through to energy-intensive sectors of the economy: trucking, airlines, agriculture, and petrochemicals such as plastics. Although energy's share of the economy has diminished in recent decades, Americans paid $740 billion for oil and gas products in 2007,[12] and energy prices still have a major impact on inflation. Because oil and gas behave and are traded as commodities, their prices can undergo large changes even apart from immediate supply and demand factors. This volatility, from all sources, can make it difficult for businesses and individuals to plan and adhere to their budgets for energy costs. Price jolts stemming from undependable supplies can have major, adverse effects on the whole economy. Economists Hillard Huntington and Stephen Brown have found that "Historical experience shows that the Gross Domestic Product (GDP) losses associated with oil supply shocks can be considerable."[13] Most strikingly, they noted that 10 of the 11 U.S. recessions since World War II were preceded by sharply rising oil prices.

Given Americans' consumption of petroleum products in excess of domestic supply, the country runs a staggering trade imbalance. Between 2004 and 2009, the U.S. trade balance for oil and gas ranged between negative $186 billion and negative $414 billion per year—typically exceeding the much-publicized trade deficit with China.[14] Economic theories of comparative advantage may suggest that particular trade deficits are not worrisome—but the large, sustained trade deficit incurred to import petroleum, particularly, makes energy a significant factor in America's overall trade, deficit, and financing strategies and challenges.

Environmental and safety challenges. This report has documented in painful detail the far-reaching environmental consequences of catastrophic accidents involving the extraction of oil from offshore sources, and the associated risks to workers' safety from drilling, refinery operations, and the emergency clean-up of spills. Further environmental damage occurs when oil products are used as transportation fuels. Emissions released when fuel is burned are generally controlled under federal law, but can still (in combination with emissions from combustion to generate electricity) create conditions that can cause serious health consequences for the American public and serious ecological consequences for our natural systems, forests, and waters. And the combustion of all fossil-based carbon fuels (oil, gas, and coal) has long-term impacts on the increasing volume of greenhouse gases in the atmosphere and the warming climate. Transportation fuels contribute one-third of U.S.

carbon emissions, making them the nation's second-largest source contributing to climate change.

Criteria for balanced energy policy. Reconciling the multiple, sometimes conflicting aims that underlie any transportation-related American petroleum energy policy depends on six criteria:

- Maintaining a sufficient reserve of petroleum to protect American national security should access to foreign sources be lost or become unreliable;
- Requiring energy-efficient automobiles and other vehicles (among other sources of consumption) to reduce fuel use, and promoting energy-efficient transit alternatives;
- Promoting the development of clean and domestically produced alternative fuels or sources of power for transportation;
- Managing the inherent risks of domestic production of oil and gas—including from offshore areas—while considering the short- *and* long-term availability of these fuels;
- Requiring safe operations to protect human health; and
- Protecting the natural environment, including steps to limit climate change.

Reasonable people can disagree about the relative importance of these criteria—and have over time. President Truman ordered a postponement of mineral development on the outer continental shelf in order to ensure oil and gas would be there later for strategic purposes. During the 1970s, Congress adopted legislation to maximize environmental protection, and then to expand energy production (as discussed in Chapter 3)—but over the long term, none can be pursued to the exclusion of the others. It is notable, moreover, that various policies *have* had significant effects on U.S. energy use and production. For example, the country has achieved intermittent but sizable increases in automobiles' fuel efficiency; major reductions in tailpipe emissions from gasoline-fueled vehicles; and less reliance on oil to generate electricity.[15] At several points during the past four decades, consumption of oil in the United States actually *declined* for several years (in some cases reflecting adverse economic conditions, and in others successful public policies and adoption of technological advances).[16]

The United States today pursues many discrete policies bearing on all of these issues: vehicle-fuel efficiency standards, subsidies for ethanol production for fuel, research into alternative fuels, varying incentives for production of electricity by wind and solar power, and so on. In the aggregate, they are, de facto, the nation's energy policy. But they do not constitute a comprehensive, coherent strategy—such as recently called for by both the National Research Council[17] and the President's Council of Advisors on Science and Technology[18]—one that encompasses *all* of these elements, identifies tradeoffs and priorities, and implements them through incentives, investments in research and development, regulations, and tax policy. Difficult though it may be to arrive at such a consensus, it would provide guidance on balancing the risks and rewards of oil and gas development in especially challenging or sensitive locations, offshore or elsewhere. It is possible—and imperative—to manage that balance over time for offshore development of oil and gas as part of that overall policy.

Learning from the Macondo Disaster: The Gulf of Mexico

This report describes in great detail what went wrong on the *Deepwater Horizon* and in the drilling of the Macondo well, and the well blowout's staggering cost. As the nation considers exploring for and producing energy from offshore frontiers, we have a new opportunity to do things right. Some of those frontiers are in deeper waters or unexplored areas of the Gulf of Mexico. Others are at the far extreme of the country, in both distance and climate in Alaska.

Improving safety and environmental integrity immediately. It will take several years to fully implement the stringent new safety regime this Commission has recommended—essential changes from doing business as usual in the Gulf of Mexico. But it is not necessary to put deepwater drilling on hold until all the changes are in place. The national and regional energy and economic imperatives can be reconciled effectively with the equally urgent needs to assure human safety and environmental integrity in the Gulf context, now and in the long term.

Several benchmarks must be met for exploratory drilling to resume on existing leases, and for operations to begin on new ones. Operators must assure that better practices for maintaining well integrity and the isolation of hydrocarbons are used at all times. And they must insist upon heightened vigilance throughout all the steps from the inception of well design to the consideration of changes during drilling operations. Similarly, protocols for testing of blowout preventers must be put in place and enforced. The industry must also demonstrate that it is deploying readily available and effective systems for containment and response.

As the energy industry works to satisfy these requirements, the Department of the Interior must work promptly to reorganize its divisions, augment its regulatory staff, and enhance their skill. The American public has every reason to insist that Congress provide regulators with adequate resources to do their vital job—and that the industry apply its resources and expertise to improving practices. Both must focus on the substantial challenges of making offshore drilling safe, reliable, and productive. The circumstances demand a shared commitment by government and industry to work for immediate and long-term reforms that allow deepwater exploratory drilling to resume quickly and safely. And, to that end, industry should be ready to pay fees as part of their lease agreements in order to ensure that government overseers have the resources required to get the job done in a rigorous and timely fashion.

Emerging challenges from ultra-deepwater drilling. That shared commitment must extend beyond current conditions. While correcting the many problems revealed at the Macondo well, both industry and government must anticipate and adjust to new challenges arising in the Gulf. Current technology enables drilling in water *twice as deep* as Macondo. Drilling at such depths requires all parties to set their standards still higher for difficult issues such as remote containment systems in water depths with extreme pressures and very limited human access, as well as different geological pressures and formations and mixes of hydrocarbons. Desire to tap resources in deeper waters should be accompanied by equivalent investments in subsea equipment, operator training, research and development

for containment and response technologies, demonstrated financial capacity, and continuous improvement in and communication of industry practices devoted to safety.

The emerging international challenge. Drilling for oil in the Gulf of Mexico is not solely a matter for U.S. consideration. Both Mexico and Cuba have expressed interest in deepwater drilling in the Gulf in the near future. Pemex, Mexico's state-owned petroleum company, and Cuba, through both the Spanish company Repsol and the large Russian oil and gas production company Gazprom, in which the Russian government maintains a controlling stake,[19] have either actually drilled exploratory and production wells or are likely soon to do so.[20] Potential drilling sites are close enough to waters and land within U.S. jurisdiction—Cuba's mainland lies only 90 miles from Florida's coast and the contemplated wells only 50 miles—that if an accident like the *Deepwater Horizon* spill occurs, fisheries, coastal tourism, and other valuable U.S. natural resources could be put at great risk.

It is in our country's national interest to negotiate now with these near neighbors to agree on a common, rigorous set of standards, a system for regulatory oversight, and the same operator adherence to the effective safety culture called for in this report, along with protocols to cooperate on containment and response strategies and preparedness in case of a spill. Though some precedent exists for a direct agreement between the United States and Cuba, Mexico may prove an important partner in developing such an agreement covering the entire Gulf of Mexico. In any event, the U.S. objectives should be to prevent drilling by companies unwilling or unprepared to meet the high safety standards essential to extracting oil and gas resources responsibly and to have a verification process to ensure compliance.

Beyond the Gulf of Mexico: Frontier Regions

The nation's demand for domestic oil production will push the boundaries of technology and geography. The industry will develop new exploration and extraction techniques and equipment in new areas in the decades ahead. Drilling safely in the Gulf of Mexico requires a new industry safety culture and significantly improved regulatory oversight. Those reforms, and further heightened vigilance, will be required for oil exploration and production in frontier offshore regions. When the Macondo blowout dumped enormous volumes of oil into the Gulf waters, scientists and policymakers realized how little was known about biological systems, environmental conditions, and even key aquatic and coastal species. Leasing of vast acreage combined with weak policies and limited funding had resulted in inadequate studies of unique habitats and sensitive environmental features where greater caution should be exercised. What information was available was often not shared, or was disregarded, in leasing and permitting decisions. And little, if any, research or policy existed to address human health impacts and the risks to responders from a major spill, or the far-reaching effects of such a disaster on other businesses dependent on the region's resources.

In addition to these challenges, each frontier area presents important differences in implementing any drilling program—different geologies, hydrocarbon formations, coastal communities and environments, and climate conditions, to mention some. Federal waters of the United States other than the central and western Gulf of Mexico, parts of

Southern California, and the Lower Cook Inlet in Alaska would be regarded as frontier territory. In the late 1970s, attention turned briefly to areas off of northern California and Massachusetts (Georges Banks), and in the early 1980s, the potential of the outer continental shelf off Alaska attracted considerable investment (see Chapter 2). In recent years, the focus has turned to exploring in the Atlantic Ocean off the state of Virginia; in the eastern Gulf of Mexico; and, most notably, to taking another serious look at offshore regions in the Alaskan Arctic. Drilling water depths of 10,000 feet or more anywhere in the Gulf of Mexico might also be considered opening a new frontier, given the new technologies required.

In March 2010, President Obama and Interior Secretary Ken Salazar announced a plan to open the eastern Gulf and parts of the Atlantic coast—including offshore Virginia—to oil and gas exploration (subject to studies of the suitability of doing so in each area, and to the lifting of a congressional moratorium restricting drilling in the eastern Gulf). But on December 1, in the wake of the *Deepwater Horizon* experience and the resulting broad restructuring of regulations and the federal oversight capabilities, Secretary Salazar announced that the Administration would not proceed with drilling in areas where there are "no active leases" during the next five-year leasing plan. As a result, exploration and production in certain frontier areas—the eastern Gulf and off of the Atlantic and Pacific coasts—are deferred. The Secretary also indicated that plans for 2011 drilling in Alaska's Beaufort Sea would be subjected to additional environmental assessments. There will consequently be a continuing examination of the various stages of drilling, if pursued, consistent with national energy policy and with a full awareness of the risks and of the values that must be balanced in each region, and with assurance that operators rigorously adhere to the best practices of a functioning safety culture.

By their very location and nature, these frontier areas differ from the Gulf of Mexico and in important respects from each other. Environmental and biological conditions are at least as well understood along the Atlantic coast as in the Gulf—and there are also important facilities, such as Coast Guard installations in place; in contrast, equivalently detailed geological and environmental information does not exist for the Arctic exploration areas of greatest interest for energy exploration—and industry and support infrastructures are least developed, or absent, there. In the near term, the Alaskan frontier is likely to attract the greatest attention, and to require the closest scrutiny, given the potential energy resources and the physical and environmental challenges of pursuing them safely.

Large prospects in offshore Alaska. The interest in offshore Alaska reflects the likelihood of finding significant new sources of oil:[21] the Chukchi and Beaufort Sea areas off Alaska's north coast rank behind only the Gulf of Mexico in estimated domestic resources.[22] The most recent federal lease sales for the Beaufort Sea, from 2003 to 2008, netted $98 million, reflecting high levels of industry interest. And despite its remoteness and harsh conditions, the Chukchi Sea—with vast potential resources—attracted over $2.6 billion in high bids for almost 2.8 million acres, including $2.1 billion from Shell Oil Company, during a 2008 lease sale.[23]

If deemed feasible, new offshore Alaskan oil production may be well-timed to offset the sustained decline in output elsewhere in Alaska. Oil production in the state (primarily from the onshore field at Prudhoe Bay) has decreased by more than two-thirds, from the 1988 peak of 2 million barrels per day to 645,000 barrels per day in 2009.[24] Depending on future prices, this decline could constitute a threat to the state's economy, which is highly dependent on oil and gas revenues and related employment. The Energy Information Administration projects that Alaska's production will continue to decline, to just 420,000 barrels per day by the end of this decade.[25] Such declines could threaten the viability of the Trans-Alaska Pipeline System, which transports oil from the North Slope to the port at Valdez.

Despite the Energy Information Administration's pessimism about long-term production trends in Alaska, other projections show a potential upswing[26] An optimistic scenario developed in 2009 study by Northern Economics for Shell Exploration and Development projects production from multiple Alaska outer continental shelf sites beginning in 2018 and eventually peaking at 1.8 million barrels of oil per day.[27] (New pipelines would need to be built to connect these reservoirs, if brought into production, to the Trans-Alaska Pipeline System.)

But finding and producing those potentially important supplies of oil offshore Arctic Alaska requires the utmost care, given the special challenges and risks associated with this frontier. Many of these challenges also arise elsewhere in the world, as Russia, Norway, Canada, and Denmark (Greenland) evaluate their Arctic oil and gas resources. The Alaskan Arctic is characterized by extreme cold, extended seasons of darkness, hurricane-strength storms, and pervasive fog—all affecting access and working conditions. The Chukchi and Beaufort Seas are covered by varying forms of ice for eight to nine months a year. These conditions limit exploratory drilling and many other activities to the summer months. The icy conditions during the rest of the year pose severe challenges for oil and gas operations and scientific research. And oil-spill response efforts are complicated year-round by the remote location and the presence of ice, at all phases of exploration and possible production.

The geological pressures in hydrocarbon deposits in shallow seas off Alaska are likely to be substantially below those encountered at Macondo, reducing some of the risks of a major blowout and challenges of containment. But oil spilled off Alaska (from blowouts, pipeline or tanker leaks, or other accidents) is likely to degrade more slowly than that found in the Gulf of Mexico because of lower water temperatures, reduced mixing of the oil into the water due to the presence of ice, and the shallower depths through which oil would travel from the wellhead to the surface. Some think the slow weathering could facilitate the skimming and in situ burning of escaped oil under ideal weather conditions, but the slow pace of natural dispersion means that oil would linger much longer in the marine environment. And serious questions remain about how to access spilled oil when the area is iced over or in seasonal slushy conditions.

The Arctic ecosystem, the need for scientific information and informed decision-making, and Alaska native peoples. The stakes for drilling in the U.S. Arctic are raised by the richness of its ecosystems. The marine mammals in the Chukchi and Beaufort are among the most diverse in the world, including seals, cetaceans, whales, walruses, and bears. The Chukchi Sea is home to roughly one-half of America's and one-tenth of the world's polar bears.[28] In November 2010, the U.S. Fish and Wildlife Service ruled that a large part of the polar bears' "critical habitat" included sea ice in the Beaufort and Chukchi Seas.[29] The Chukchi and Beaufort Seas also support millions of shorebirds, seabirds, and waterfowl, as well as abundant fish populations.

It is known that these are vibrant living systems, but scientific research on the ecosystems of the Arctic is difficult and expensive. Good information exists for only a few species, and even for those, just for certain times of the year or in certain areas. As a result, the Commission recommends an immediate, comprehensive federal research effort to provide a foundation of scientific information on the Arctic (with periodic review by the National Academy of Sciences), and annual stock assessments for marine mammals, fish, and birds that use the Beaufort and Chukchi Seas. This initiative should be coordinated with the state of Alaska, native organizations, academic institutions, non-governmental organizations, the private sector, and international partners. The information generated should be capable of informing decision-making related to oil and gas leasing, exploration, and development and production in the Arctic; measuring and monitoring impacts of oil and gas development on Arctic ecological resources; natural resource damage assessment should an oil spill occur and protocols in any treaty negotiated among the Arctic nations. The existing gaps in data also support an approach that distinguishes in leasing decisions between those areas where information exists and those where it does not, as well as where response capability may be less and the related environmental risks may therefore be greater. The need for additional research should not be used as a *de facto* moratorium on activity in the Arctic, but instead should be carried out with specific timeframes in mind in order to inform the decision-making process.

The Inupiat Eskimos of Alaska's remote arctic and subarctic communities rely heavily for their subsistence on resources from the marine environment, particularly bowhead whales. Bowhead whales can reach 60 feet in length and weigh more than 120,000 pounds. They migrate from Russian to Canadian waters and back through the Chukchi and Beaufort Seas.[30] They are the most important subsistence animal for the coastal communities of northwest and northern Alaska.[31] Whale hunting and the customs surrounding it are also an important part of their cultural heritage. Oil and gas development has the potential, directly or indirectly, to affect hunting success or the habitats of species important to subsistence. (Of course, offshore oil development could play a positive economic role in the native communities; some Inupiat whaling captains also work in the oil industry, for instance.) An Arctic Regional Citizens Council could help assure the active participation of the people who know this region the best in planning and response.

Arctic spill response and containment. The remoteness and weather of the Arctic frontier create special challenges in the event of an oil spill. Successful oil-spill response methods from the Gulf of Mexico, or anywhere else, cannot simply be transferred to the Arctic.

Industry and academic organizations are conducting research on response to oil on ice, but more needs to be done. A comprehensive interagency research program to address oil-spill containment and response issues in the Arctic should be developed, funded, and implemented within the federal government. Spill trajectory and weather models based on Arctic conditions must also be developed. This research should be funded promptly by the Oil Spill Liability Trust Fund, and the resulting analysis should inform when and where leasing occurs.

The National Contingency Plan requires the Coast Guard to oversee oil-spill planning and preparedness, and to supervise an oil-spill response in coastal waters. Current federal emergency response capabilities in the region are very limited: the Coast Guard operations base nearest to the Chukchi region is on Kodiak Island, approximately 1,000 miles from the leasing sites. The Coast Guard does not have sufficient ice-class vessels capable of responding to a spill under Arctic conditions: two of its three polar icebreakers have exceeded their service lives and are non-operational.[32] In addition to overseeing spill response, the Coast Guard provides search and rescue capabilities in other areas. Without a presence in the Arctic, it would be very difficult for the Coast Guard to conduct any emergency search and rescue operations.

To deal with these serious concerns about Arctic oil-spill response, containment, and search and rescue, the Commission recommends three approaches before the Department of the Interior makes a fully informed determination that drilling in a particular area is appropriate. First, the Department of the Interior should ensure that the containment and response plans proposed by industry are adequate for each stage of development and that the underlying financial and technical capabilities have been satisfactorily demonstrated in the Arctic. Second, the Coast Guard and the oil companies operating in the Arctic should carefully delineate their respective responsibilities in the event of an accident, including search and rescue, and then must build and deploy the necessary capabilities. Third, Congress should provide the resources to establish Coast Guard capabilities in the Arctic, based on the Coast Guard's review of current and projected gaps in its capacity.

International standards for Arctic oil and gas. The Arctic is shared by multiple countries, many of which are considering or conducting oil and gas exploration and development. The extreme weather conditions and infrastructure difficulties are not unique to the U.S. Arctic. The damages caused by an oil spill in one part of the Arctic may not be limited to the waters of the country where it occurred. As a result, the Commission recommends that strong international standards related to Arctic oil and gas activities be established among all the countries of the Arctic. Such standards would require cooperation and coordination of policies and resources. The Arctic Council[33] has begun work in this direction, updating its voluntary Arctic Offshore Oil and Gas Operation Guidelines in 2009. The International Standards Organization is also developing international standards for Arctic offshore structures that would apply to the activities of petroleum and natural gas industries in Arctic and cold regions. These guidelines are expected to specify requirements and provide recommendations and guidance for the design, construction, transportation, installation, and removal of offshore structures in the Arctic. Additional work is needed to strengthen

these guidelines and standards, ensuring that they are both consistent and mandatory across the entire Arctic, and the United States could pay an important leadership role in securing these vital safeguards.

Bringing the potentially large oil resources of the Arctic outer continental shelf into production safely will require an especially delicate balancing of economic, human, environmental, and technological factors. Both industry and government will have to demonstrate standards and a level of performance higher than they have ever achieved before. One lesson from the *Deepwater Horizon* crisis is the compelling economic, environmental, and indeed human rationale for understanding and addressing the prospective risks comprehensively, before proceeding to drill in such challenging waters.

Conclusion

Creating and implementing a national energy policy will require enormous political effort and leadership—but it would do much to direct the nation toward a sounder economy and a safer and more sustainable environment in the decades to come. In the meantime, decisions about offshore drilling—one crucial element in any discussion of energy supply—remain controversial. The reaction to the December 1 decision to defer offshore exploration and production in the eastern Gulf of Mexico and along the Atlantic and Pacific coasts illustrates the polarization of opinion. Energy companies, seeking to pursue potential reserves in brand-new frontiers, criticized the announcement for closing off too many areas. Others, more concerned about environmental protection and national security, however, questioned why the Secretary was even considering allowing future drilling in these areas at all. And there were sharp differences in response among public officials in different regions, reflecting their local economies and sources of revenues.

These reactions echo the divided opinions presented to this Commission throughout its work. Though the Commission heard many ideas for improving safety and other aspects of offshore drilling, we also heard from Americans who advocate no future drilling whatsoever; they cited the adverse effects of fossil fuels on the climate, environmental damage, safety, and other factors.

Whether additional offshore drilling proceeds soon, in the longer term, or never depends on evolving public opinion. Given Americans' consumption of oil, finding and producing additional domestic supplies will be required in coming years, no matter what sensible and effective efforts are made to reduce demand—in response to economic, trade, and security considerations, and the rising challenge of climate change.

The extent to which offshore drilling contributes to augmenting that domestic supply depends importantly on rebuilding public faith in existing offshore energy exploration and production. That rebuilding begins with a clear, independent explanation of what happened at the Macondo well in April 2010, and of the reforms required in the wake of that terrible tragedy. That has been the work of this Commission, published in this report; the forthcoming separate report of the Commission's Chief Counsel; and background materials available on the Commission's website. Together, they present a clear, independent,

unvarnished picture of what happened and why—and of the major reforms the nation must adopt.

This Commission proposes in this report a series of recommendations that will enable the country and the oil and gas industry to move forward on this one critical element of U.S. energy policy: continuing, safe, responsible offshore oil drilling to meet our nation's energy demands over the next decade and beyond. Our message is clear: both government and industry must make dramatic changes to establish the high level of safety in drilling operations on the outer continental shelf that the American public has the right to expect and to demand. It is now incumbent upon the Congress, the executive branch, and the oil and gas industry to take the necessary steps. Respect for the 11 lives lost on that tragic day last April requires no less.